The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 16 CHICAGO July 30, 1921

EDITORIAL DEPARTMENT—

Nathan C. Rockwood, Editor
Chas. A. Breskin, Assistant Editor

ADVERTISING STAFF—

Charles H. Fuller, Eastern Manager, 101 West 41st Street, New York City

A. S. Barnett
Western Representative

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ROCK PRODUCTS—

Geo. P. Miller, Manager
E. M. Gibson, Assistant Manager

Published every other Saturday by

TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.

W. D. Callender, President.
N. C. Rockwood, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

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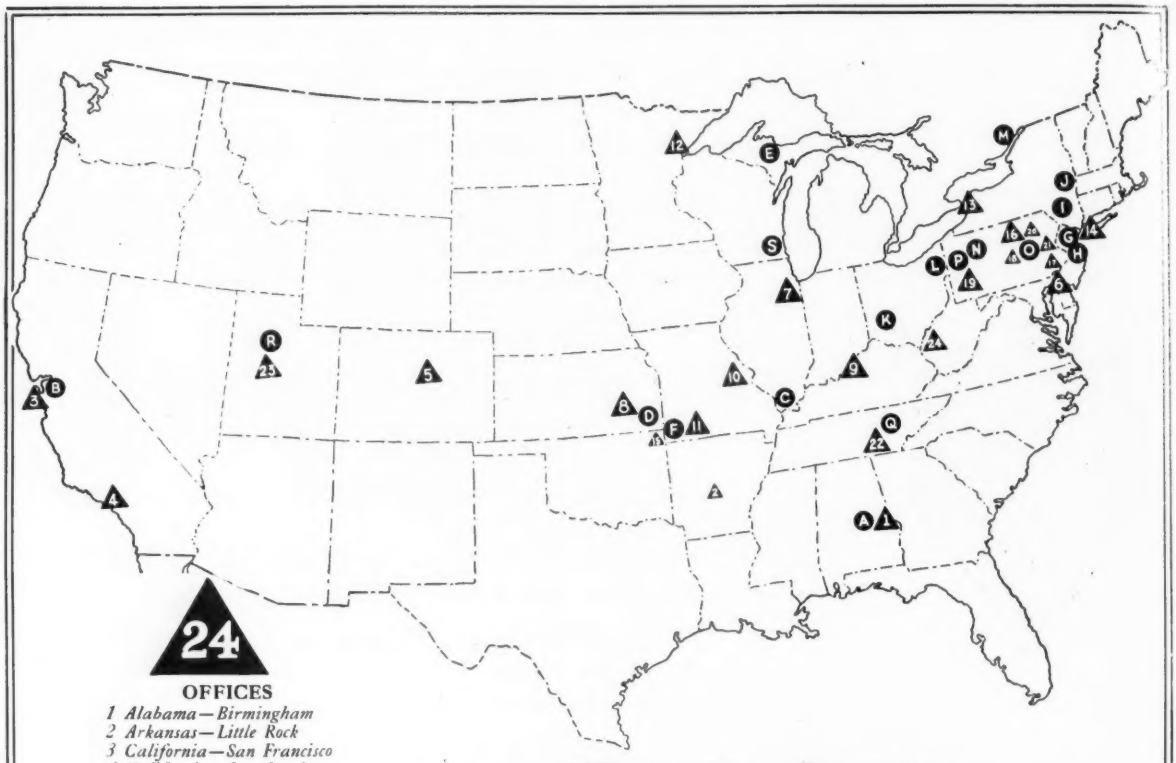

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If you are interested in the elimination of waste in industry, put the Hercules Service Division to work on your blasting problems. It will cost you nothing and is apt to save you money.

By acquiring the business of the Aetna Company, we have assumed increased service obligations to the users of explosives all over the country and shall welcome any opportunity to demonstrate our readiness and ability to meet them.

Book describing Hercules Products furnished on request.

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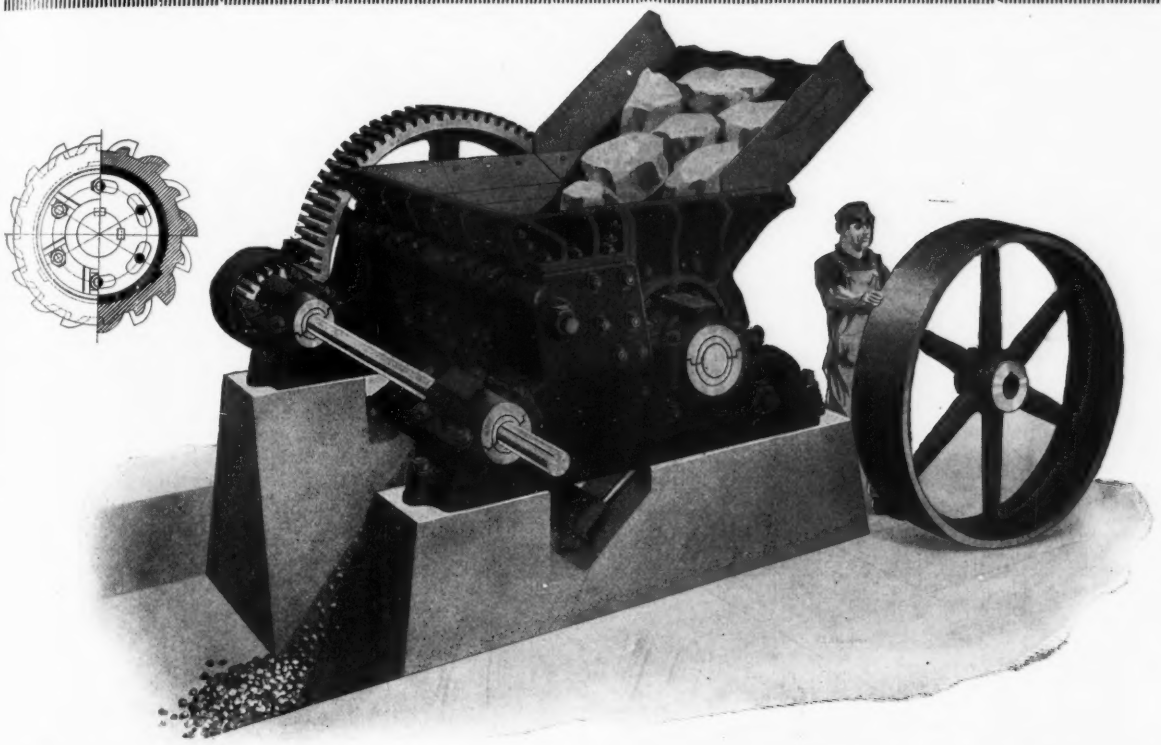

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This is a Single Roll Swinging Plate Crusher—our Model A-339—and while it is new in design, and an innovation in the crushing industry, it is old enough to have proven its efficiency, value and worth.

All wearing parts of this machine are made of the very hardest and toughest materials—manganese and other heat-treated steels. The teeth on the roll are transferable, thereby keeping up the efficiency and reducing the upkeep costs, and roll disks can be assembled to accommodate material being crushed, staggering the teeth or placing them all in a straight line. The breaking plate is provided with liners, half and quarter soles, of manganese or other heat-treated steels, and these can be changed on the breaking plate, thereby getting three different wearings from the same piece of metal. The bearings are big and strong, amply providing for any emergency. The gear teeth are short stub type of immense strength.

Stevenson Roll Crushers are self-feeding.

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In comparing the cost of excavating by different methods, The Trumbull Public Service Corp. of Warren, Ohio, found that their Brownhoist saved them $1584 on one job alone. "Excavating for our power plant cost us $1.10 per yard with a steam shovel," writes this company. "Under very similar conditions, excavating for our new plant, with a Brownhoist, cost us only 77 cents per yard, a saving of 33 cents."

Besides this saving, this company has found that it is much more economical to load the trucks on the surface instead of having to go down into the excavation. This they can do with a Brownhoist but could not do by the old method.

The flexibility of a Brownhoist makes it adaptable to many other jobs in construction work. Catalog K shows different sizes and types of Brownhoists and the work they are doing in a variety of industries. May we send you a copy?

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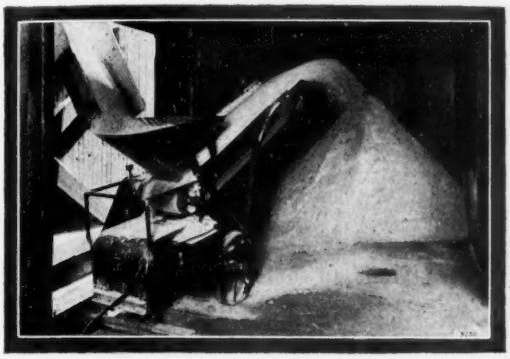

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The Link-Belt Pratt Box-Car Loader

THE Pratt Box-Car Loader and one man can easily load a box-car in an hour. You can tell almost immediately what a great saving this machine would make daily in loading time and handling cost at your plant.

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For small and moderate sized plants this machine is a great money saver in the loading of ground lime or limestone, sand and other similar bulk materials, while for large plants the Manierre Box-Car Loader has proved itself highly efficient. It is possible to load 40 tons of sand in a car with a Pratt Loader without using a shovel.

Link-Belt Engineers will be glad to give you the benefit of their experience in the selection of the right equipment for the handling of your materials.

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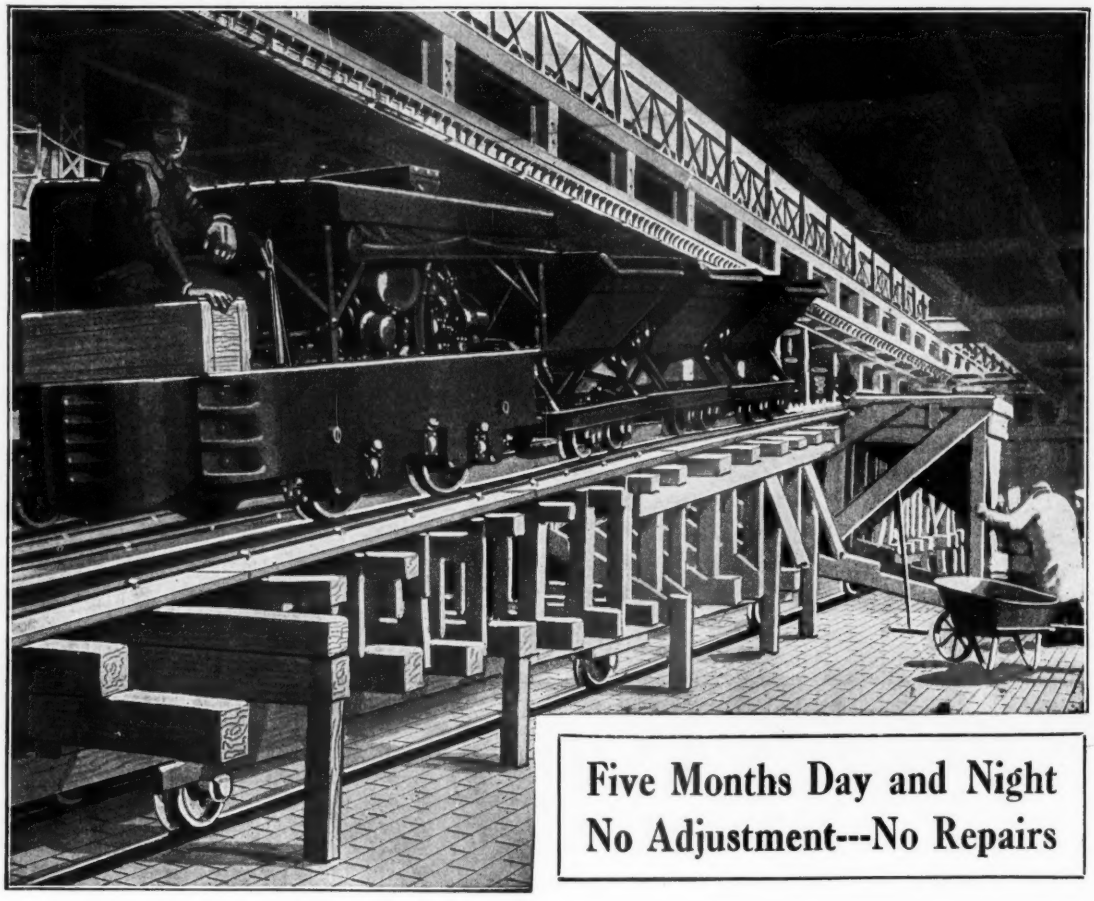


Five Months Day and Night No Adjustment---No Repairs

For five months a 3-ton PLYMOUTH Gasoline Locomotive was employed by The H. F. Friedstadt Co., General Contractors, in operations for the government at the Naval Base, Hampton Roads.

The contractors say in a letter that it gave wonderful service. Notwithstanding it was used continuously day and night, and oftimes full 24 hours without a let up.

They add that a grade of full 12 per cent or better did not reduce the efficiency of the Locomotive. Neither was it necessary to adjust the eugine or make repairs of any sort.

There's a PLYMOUTH awaiting your order and ready to give you a like service without complaint, or demand for increased pay. It is built to serve and take the grief and knocks.

Write for descriptive literature.

THE FATE-ROOT-HEATH COMPANY, Plymouth, Ohio

PLYMOUTH

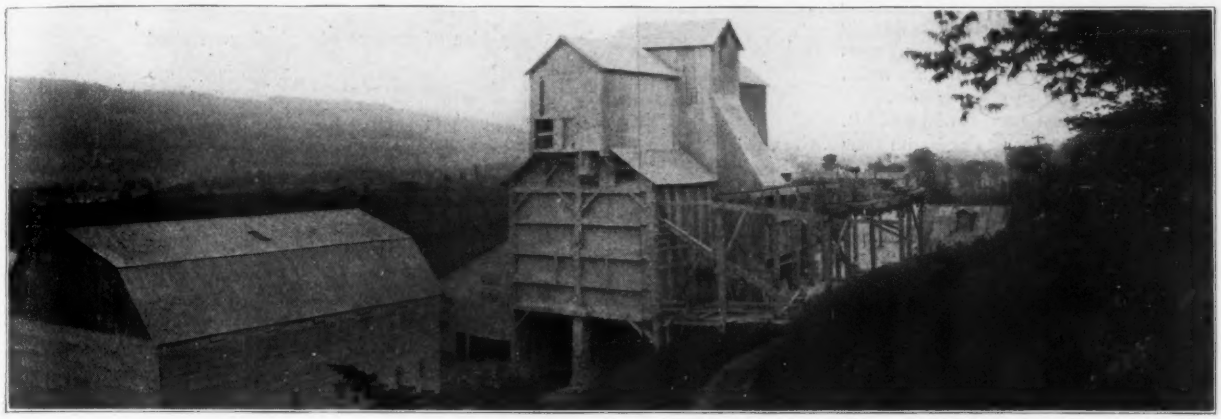
Gasoline Locomotives

Rock Products

Vol. XXIV Chicago, July 30, 1921 No. 16

A New York Limestone Quarry

Norton Stone and Lime Company Plant at Cobleskill



General view of the plant of the Norton Stone and Lime Co. at Cobleskill, N. Y.—Agricultural limestone storage and shipping warehouse in the left-hand foreground

THE HISTORY of the Norton Stone and Lime Co., Cobleskill, N. Y., is interesting and merits some reflection on the "agricultural lime" business.

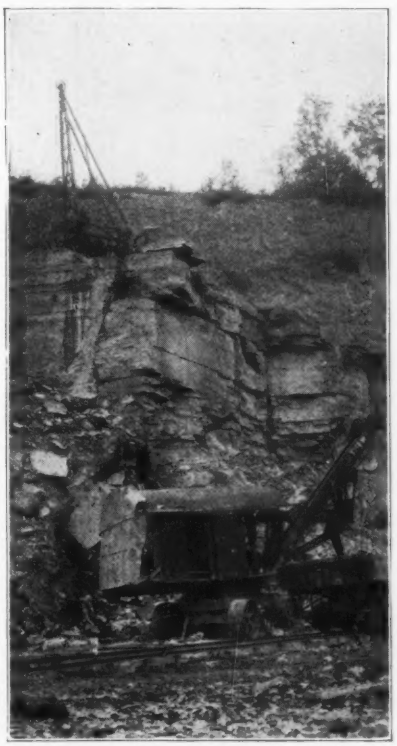
The plant of this company is located in a charming agricultural section some miles west of Albany, N. Y. The stone is a quite dark grayish magnesium limestone, which was once burned here for lime. Like some sections of Pennsylvania and Maryland, this part of New York State has used lime in agriculture since Colonial times.

Now, however, the "lime" in the company's name has ceased to mean burned lime. It means ground limestone. The company has not had its two lime kilns in operation for over two years. It was found that the demand for ground limestone increased so rapidly that the owners decided the future pointed in that direction, and they now make agricultural limestone their principal business.

Quarry Operation

This plant has one of the heaviest strippings operations in the East, as the views herewith show. The limestone strata are nearly horizontal but are over-burdened with 10 to 25 ft. or more of pretty compact earth and broken up ledge.

Drilling is done with two well drills operated by compressed air, from an electrically-driven compressor plant in the quarry. The quarry face is 30 to 50 ft. high and is pretty well stratified as the views show. The powder used is 40 per cent gelatine dynamite.



Quarry view—Air-operated well drill—Electric shovel

A tractor-type converted Thew electric shovel is used for loading. The dipper is about ¾-yd. Electric shovels of this size and type are quite rare in quarry work, but the owners express satisfaction with the performance of this one. The same shovel is used for stripping.

Side-dump contractor type cars are used with dinky steam locomotives for motive power. The track is standard gauge. The quarry is in a hill so that there is a practically level track to the crushing plant, on one side of the hill at the entrance to the quarry.

Crushing Plant

The crushing plant is not unusual other than being of a compact and neat design. The bins are reinforced concrete and the framing heavy timber construction.

The crusher arrangement is rather unusual and is apparently very satisfactory. The primary breaker is a No. 9 gyratory arranged in a straight line with a No. 6 gyratory re-crusher on either side, about 15 ft. between centers.

The track from the quarry curves around so as to form a circuit with one side parallel to the battery of crushers. The cars are then side-dumped into the center crusher, although, of course, the plant could

be operated without the No. 9 crusher, using either one or both of the No. 6's. The plant would never have to be out of commission because of crusher trouble, except all three crushers should happen to break at the same time.

Crushers in a Row

This arrangement of crushing units in a single row, out in the open, makes possible the very handy traveling crane arrangement for handling crusher parts. Thus the plant is not only guaranteed against a total shut-down, but excellent facilities are provided for making quick repairs.

The No. 9 primary crusher discharges to a 36-in. belt and bucket elevator directly behind it, and the two No. 6 re-crushers discharge to two short belt conveyors which discharge into the same elevator boot.

The screening plant consists of two 24-ft. rotary screens, placed end to end with their head ends receiving their feed from the one elevator. The first 8 ft. of each screen has a ⅜-in. screen jacket. Everything larger than commercial size (2½ or 3-in.) is rejected at the end of the screen and goes by gravity to the No. 6 crushers, one of which serves as a rejections crusher for each screen.

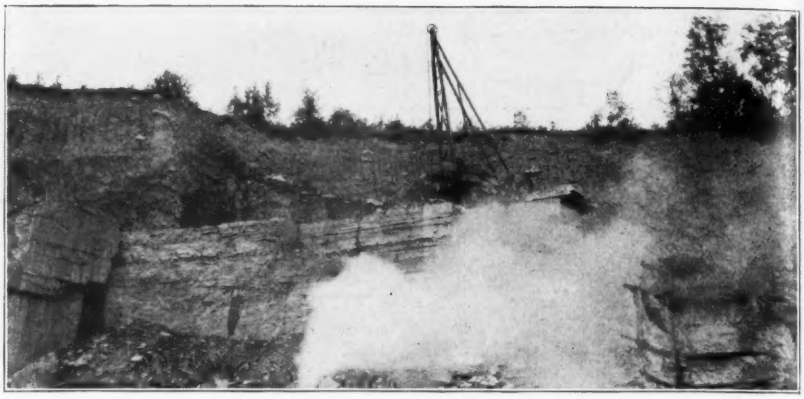
Another quarry view showing timber on overburden

The battery of crushers and the elevator are all driven from a single line shaft by a 350-h.p. electric motor. The screens have individual motor drives.

Agricultural "Lime" Plant

The fines or screenings are very clean, as the quarry is carefully stripped, and go to 24x14-in. smooth-faced crushing rolls, which reduce them to agricultural limestone.

A bucket elevator removes the dust from the rolls and a long belt conveyor in the top of the agricultural limestone warehouse deposits the material in bins. This ground limestone storage or warehouse is built of reinforced concrete and holds about 100 carloads or 4,000 tons. Most of the ground limestone is sold in bulk, although facilities are provided for loading burlap bags by gravity chutes.



Quarry view giving idea of amount of stripping required

"All-Electric" Operation

With the exception of the steam locomotives, which can on a pinch be operated with hardwood fuel (there is plenty of it around here), the whole operation is run by electric power. The change was made in 1920 when the coal shortage was so acute, but a material saving in operating costs was achieved, even after coal became plentiful again.

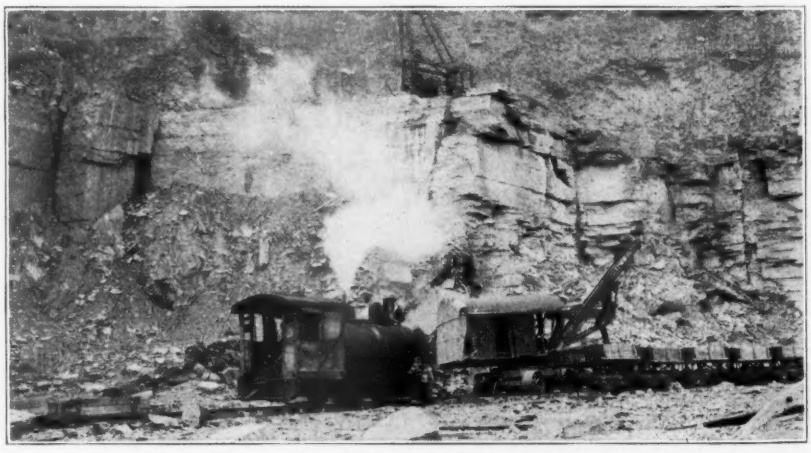
Another interesting feature of this plant is a sawmill where the company makes its own oak and other hardwood timber and lumber for car repairs, etc. As many of the trees grow on the quarry property and others can be purchased on adjoining farms this is a worth-while economy.

A. L. Norton is president, treasurer and general manager of the company, and his brother, F. P. Norton, is vice-president, secretary and superintendent.

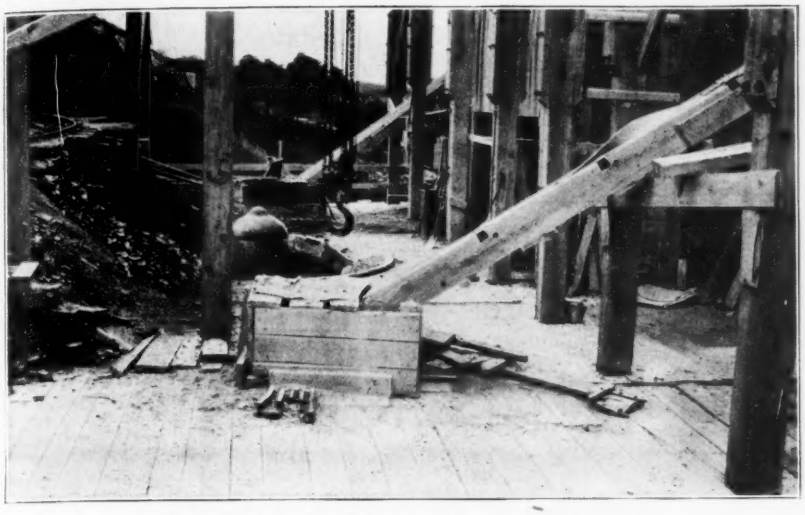
Blast in a Vermont Quarry Breaks 25,000 Tons of Slate Rock

THE VERMONT MILLING PRODUCTS CORPORATION at Fair Haven, Vt., had a spectacular blast at its quarry recently when 25,000 tons of slate rock were broken in one shot.

Ten holes, averaging 75 ft. in depth, were drilled along the face of the quarry. The charge consisted of 5,600 lbs. of 40-per cent dynamite and was exploded in one shot with Cordeau-Bickford. This is considered the largest blast ever made in the quarrying of slate rock and is the third large blast made by this company since the first of May, when they started operating their new mill for crushing green slate.



Steam locomotive and quarry cars used for transportation



Battery of three gyratory crushers ranged in row

Their product consists mainly of unfading green slate granules, which are used by the makers of the best grades of slate-surfaced roofing, and a pulverized form for a mineral filler for Asphalt road-building. This filler has been recommended by the United States Government, following exhaustive tests conducted by the Bureau of Mines and the Bureau of Public Roads. These tests were reported in Rock Products, May 7, 1921, page 35.

Campaign for Winter Road Contracts

THE ASSISTANCE of individual producers in advancing winter contracts for road work is recommended by the Illinois Concrete Aggregate Association in its weekly bulletin. The bulletin states:

The campaign to promote fall and winter contracts for road building is gathering headway and deserves the help of every aggregate producer in the country. The advantages are so obvious for all parties concerned that no reasonable highway commission can ignore them when brought strongly to their attention.

The Associated General Contractors had a conference on this subject with Herbert C. Hoover, Secretary of Commerce, on July 18. In addition to representatives of the contractors, this conference was attended by Thomas H. MacDonald, chief of the Bureau of Public Roads; Geo. P. Coleman, chairman of the executive committee of the American Association of State Highway Officials, and W. C. Markham, legislative representative of the latter organization. The representatives of all highway interests gave approval to the plan for fall and winter road contracts. Information has come to us from the Department of Commerce that Mr. Hoover will probably address a letter to the Governor of each State urging early letting of contracts for highway work. This letter will probably be made public within the next few days.

The National Association of Sand and Gravel Producers is working with the Associated General Contractors and believes that after Mr. Hoover's letter goes out it will be desirable for State associations and individual producers to write immediately to their Governors urging that favorable action be taken on Mr. Hoover's recommendation.

Home-made traveling crane for crusher repairs

Dumping track showing how any one of three crushers may be used

Public Service Commission of Indiana Acts on Injunction

WHEN THE federal Interstate Commerce Commission granted the nation-wide freight rate advances to the roads, the sand and gravel interests, among others, were able to secure a reduction on intrastate rates in Indiana.

On the application of the roads the federal courts granted an injunction which is interpreted as abolishing the state commission's control over all rates.

The Public Service Commission has asked for a modification of this injunction. If this modification can be obtained reductions in intrastate rates may be ordered by the Commission.

Proposed Standard Specifications for Concrete Aggregates

Tentative Specifications of the American Society for Testing Materials

ONCE UPON A TIME the specifications on which users bought materials were drawn by the buyers without much if any co-operation with the producers of the materials. But the manufacturers of one material after another have waked up to the fact that their interest in specifications is quite as important as the purchasers'. Producers of mineral aggregates are at last in this class.

The American Society for Testing Materials is an organization composed of both users and producers of materials. Through this organization the two parties are brought together and their views harmonized into standard specifications.

The producers of mineral aggregates are represented in the committee of the A. S. T. M. on mineral aggregates by George D. Van Sciver, president of the De Frain Sand Co., Philadelphia, Pa.; W. E. Donaldson, of the Carnegie Steel Co., Pittsburgh, Pa. (representing slag); W. R. Kleckner, National Slag Co., Allentown, Pa.; F. W. Renwick, president of the Chicago Gravel Co., Chicago, Ill.; John Rice, president of the General Crushed Stone Co., Easton, Pa., and the secretaries of the National Slag Association and the National Association of Sand and Gravel Producers, H. J. Love and E. Guy Sutton, respectively.

At the recent annual meeting of the A. S. T. M. at Atlantic City proposed tentative standard specifications for mineral aggregates were adopted as follows:

Fine Aggregate

1. Fine aggregate shall consist of sand, stone screenings, or other inert materials with similar characteristics, or a combination thereof, having clean, hard, strong, durable uncoated grains, free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam or other deleterious substances.

2. Fine aggregate shall preferably be graded from fine to coarse, with the coarser particles predominating, within the following limits:

Passing No. 4 sieve	100 per cent
Passing No. 50 sieve, not more than	30 per cent
Weight removed by elutriation test, not more than	3 per cent

Sieves shall conform to the U. S. Bureau of Standards specifications for sieves.

3. The fine aggregate shall be tested in combination with the coarse aggregate and the cement with which it is to be used and in the proportions, including water, in which they are to be used on the work, in accordance with the requirements specified in Section 6. In case the test provided in Section 6 shows the strengths specified therein, the fine aggregate shall be considered acceptable.

4. With the approval and consent of the engineer, on less important work, the following requirements may be substituted:

(*a*) Mortar briquettes, cylinders or prisms, consisting of one part by weight of portland cement and three parts by weight[2] of fine aggregate, mixed and tested in accordance with the methods described in the Standard Specifications and Tests for Portland Cement (Serial Designation: C 9) of the American Society for Testing Materials,[1] shall show a tensile or compressive strength at the age of 7 and 28 days not less than that of 1 : 3 standard Ottawa sand mortar of the same consistency made with the same cement.

Note.—In testing aggregates, care should be exercised to avoid the removal of any coating on the grains which may affect the strength; bank sand should not be dried before being made into mortar, but should contain natural moisture. The percentage of moisture may be determined upon a separate sample and the weight of the sand used in the test corrected for the moisture content.

(*b*) Upon failure to meet this requirement, the proportion of cement in the concrete mixture shall be increased or the proportions of cement, fine aggregate, coarse aggregate and water changed in such a way as to produce the strength specified in Section 6.

5. No fine aggregate showing a color darker than the standard color glass when subjected to the colorimetric test shall be used unless the strength requirement of Section 6 is fulfilled.

6. The grade of concrete required with its compressive strength in pounds per square inch shall be specified by the engineer. The concrete materials, including cement, fine aggregate, coarse aggregate and water, mixed in the proportions in which they are to be used in the work, and tested in accordance with the standard methods of test, shall at 28 days develop a strength of not less than that specified for the grade of concrete required. Upon failure to meet this requirement the proportion of cement in the concrete mix shall be increased or the proportions of cement, fine aggregate, coarse aggregate and water shall be changed in such way as to produce the specified strength.

Table of Standard Screens

Sieve Number[1] or Size in inches.	Sieve Opening.		Wire Diameter.		Tolerance, per cent.		
	in.	mm.	in.	mm.	Average Opening.	Wire Diameter.	Maximum Opening.
No. 100	0.0059	0.149	0.0040	0.102	6	20	40
No. 50	0.0117	0.297	0.0074	0.188	6	20	40
No. 30	0.0232	0.59	0.0130	0.33	4	10	25
No. 16	0.0469	1.19	0.0213	0.54	3	10	10
No. 8	0.0937	2.38	0.0331	0.84	3	10	10
No. 4	0.187	4.76	0.050	1.27	3	10	10
3/8-in.	0.375	9.5	0.092	2.33	3	10	10
3/4-in.	0.75	19.0	0.135	3.42	3	10	10
1-in.	1.00	25.4	0.162	4.12	3	10	10
1 1/2-in.	1.50	38.0	0.177	4.50	3	10	10
2-in.	2.00	50.8	0.192	4.88	3	10	10
3-in.	3.00	76.0	0.25	6.3	3	10	10

[1] Sieves No. 100 to No. 4 are based on "Table of Fundamental Data on Standard Specifications for Sieves" issued by the U. S. Bureau of Standards, 1920. The liberal tolerances will permit the use of certain sieves which do not exactly correspond to the numbers given in the table.

Coarse Aggregate

7. Coarse aggregate shall consist of crushed stone, gravel, or other approved inert materials with similar characteristics, or a combination thereof, having clean, hard, strong, durable, uncoated pieces free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter.

8. (*a*) Coarse aggregate shall be well graded from fine to coarse within the following limits:[2]

Passing — in. sieve (maximum size)	100 per cent
Passing — in. sieve (intermediate size)	— to — per cent

[1] Criticisms of these Tentative Specifications are solicited and should be directed, preferably before January 1, 1922, to Mr. A. T. Goldbeck, Secretary of Committee C-9 on Concrete and Concrete Aggregates, U. S. Bureau of Public Roads, Washington, D. C.

[2] When approved by the engineer these proportions may be by volume, assuming one cubic foot of cement to weigh 94 lb.

[1] 1918 Book of A. S. T. M. Standards.

[2] When there are several suitable aggregates available, a thorough investigation of the relative economy of each for producing concrete of the desired strength is advisable, especially for work of considerable magnitude.

Not more than 15 per cent shall pass the No. 4 sieve, not more than 5 per cent shall pass a No. 8 sieve.

(*b*) The maximum size of coarse aggregate shall be either designated by the engineer or indicated on the plans.

Note.—The grading as above specified is intended to secure uniformity of aggregate, but will be governed by local conditions. The following table indicates desirable gradings, in percentages, for coarse aggregate for certain maximum sizes:

Test for Organic Impurities in Sands

1. The test herein specified is an approximate test for the presence of injurious organic compounds in natural sands for cement mortar or concrete. The principal value of the test is in furnishing a warning that further tests of the sand are necessary before they be used in concrete. Sands which produce a color in the sodium hydroxide solution darker than the standard color should be subjected to strength tests in mortar or concrete before use.

2. (*a*) A representative test sample of sand of about 1 lb. shall be obtained by quartering or by the use of a sampler.

(*b*) A 12-oz. graduated glass prescription bottle shall be filed to the 4½-oz. mark with the sand to be tested.

(*c*) A 3-per cent solution of sodium hydroxide (NaOH) in water shall be added until the volume of sand and liquid after shaking gives a total volume of 7 liquid ounces.

(*d*) The bottle shall be stoppered and shaken thoroughly and then allowed to stand for 24 hours.

(*e*) A standard color solution shall be prepared by adding 2.5 cc. of a 2-per cent solution of tannic acid in 10-per cent alcohol to 22.5 cc. of a 3-per cent sodium hydroxide solution. This shall be placed in a 12-oz. prescription bottle, stoppered and allowed to stand for 24 hours, then 25 cc. of water added.

(*f*) The color of the clear liquid above the sand shall be compared with the standard color solution prepared as in Paragraph (*e*).

3. Solutions darker in color than the standard color have a "color value" higher than 250 parts per million in terms of tannic acid.

4. The report of tests shall include the following:

(*a*) The kind and origin of concrete materials;

(*b*) Complete data on all tests of cement and aggregates;

(*c*) A description of methods of making and testing the concrete, where methods deviate from the proposed standards;

(*d*) The quantities of cement, aggregates and water in each batch;

(*e*) The method of measuring workability or plasticity with "slump" or "flow" of concrete;

(*f*) The quantity of water expressed as a ratio to volume of cement;

(*g*) The age at test;

(*h*) The size of test pieces;

(*i*) The date of molding and testing each cylinder;

(*j*) The compressive strength in pounds per square inch of each test piece and average of tests in a set;

(*k*) A description of failure and appearance of concrete on each test piece.

(*l*) The unit weight, density and yield of the concrete.

[1]Criticisms of this Tentative Method are solicited and should be directed, preferably before January 1, 1922, to Mr. A. T. Goldbeck, Secretary of Committee C-9 on Concrete and Concrete Aggregates, U. S. Bureau of Public Roads, Washington, D. C.

Sieve Analysis of Aggregates

1. A representative test sample of the aggregate shall be selected by quartering or by use of a sampler, which after drying will give not less than the following:

(*a*) Fine aggregate, 500 g.

(*b*) Coarse aggregate or a mixture of fine and coarse aggregates, weight in grams, 3,000 times size of largest sieve required, measured in inches.

2. The sample shall be dried at not over 110° C. (230° F.) to constant weight.

3. (*a*) The sieves shall be of square-mesh wire-cloth and shall be mounted on substantial frames constructed in a manner that will prevent loss of material during sifting.

(*b*) The size of wire and sieve openings shall be as given in Table I.

4. (*a*) The sample shall be separated into a series of sizes by means of the sieves specified in Section 3. Sifting shall be continued until not more than 1 per cent by weight of the sample passes any sieve during 1 minute.

(*b*) Each size shall be weighed on a balance or scale which is sensitive to 1/1000 of the weight of the test sample.

(*c*) The percentage by weight of the total sample which is finer *than each* of the sieves shall be computed.

5. (*a*) The percentages in sieve analysis shall be reported to the nearest whole number.

(*b*) If more than 15 per cent of a fine aggregate is coarser than the No. 4 sieve, or more than 15 per cent of a coarse aggregate is finer than the No. 4 sieve, the sieve analysis of the portions finer and coarser than this sieve shall be reported separately.

Table I—Sieve Analysis of Coarse Aggregates

Maximum Size of Aggregate, in.	Circular Openings, in.								Passing Screen having Circular Openings ¼ in. in Diameter, not more than
	3	2½	2	1½	1¼	1	¾	½	
3	100	...	...	40–75	...	...	...	...	15 per cent
2½	...	100	...	...	40–75	...	...	...	15 "
2	...	...	100	...	...	40–75	...	...	15 "
1½	...	...	...	100	...	...	40–75	...	15 "
1¼	...	...	...	...	100	...	...	35–70	15 "
1	...	...	...	...	...	100	...	40–75	15 "
¾	...	...	...	...	...	...	100	...	15 "

Note.—These specifications were formulated in conference with members of the Joint Committee on Concrete and Reinforced Concrete.

Portland Cement in the First Half of 1921

THE APPROXIMATE PRODUCTION and shipments of finished portland cement in the United States, by months, and the stocks at mills at the end of each month, during the first half of 1921 are shown in the accompanying table. The total production for the six months ending June 30, 1921, represents about 94 per cent of the quantity made in the corresponding period of 1920 and over 42 per cent of the total production in 1920; the shipments are about 98 per cent of those of the first half of 1920, and nearly 42 per cent of those for the whole year 1920. The stocks, which amounted to more than 11,000,000 barrels, are slightly above normal, comparing with approximately 9,000,000 barrels, on June 30, 1920, and 8,941,046 barrels on December 31, 1920.

The year 1921 began with mills producing at a moderate rate and shipments considerably less than production, but month by month both production and shipments of finished cement increased at a rapid rate, shipments exceeding production in May and June. Production in June was slightly greater than in June, 1920, and also a little above the average for that month during the last five years. The shipments in June of more than 10,500,000 barrels were larger than those of any preceding June.

Clinker (unground cement) produced during the first six months amounted to more than 43,500,000 barrels, more than 9,000,000 barrels of which were produced in June. This is also a new high record. Stocks of clinker are reported to be more than 4,600,000 barrels, a quantity slightly above normal.

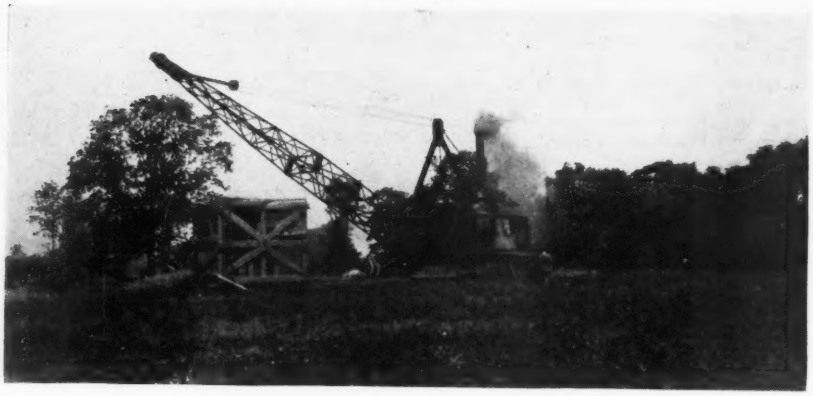
These figures indicate that the cement industry is far better off than many others at the present time.

These statistics, which were prepared under the direction of Ernest F. Burchard are based largely upon reports from manufacturers of portland cement and to a small extent upon estimated data, and are subject to revision. It is hoped to issue similar statistics of the portland cement industry each month in the future.

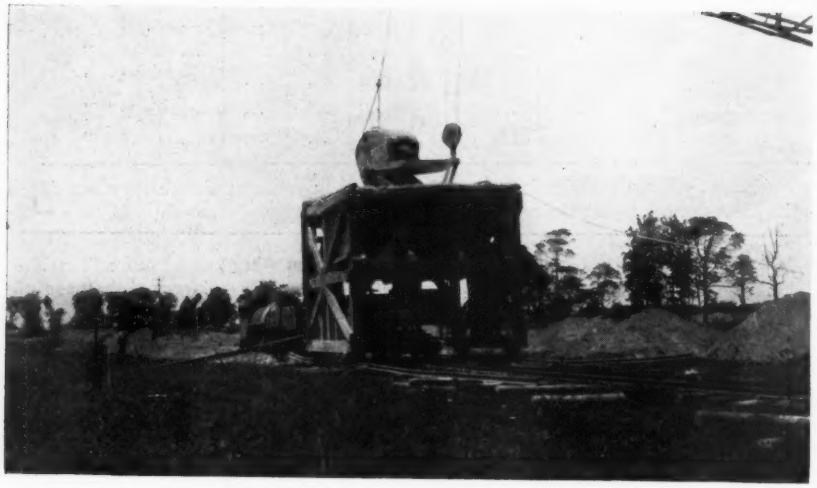
FINISHED PORTLAND CEMENT PRODUCTION, SHIPMENTS, AND STOCKS BY MONTHS IN FIRST HALF OF 1921

Month	Production (Barrels)	Shipments (Barrels)	Stocks at end of mo. (Barrels)
January	4,098,000	2,539,000	10,300,000
February	4,379,000	3,331,000	11,400,000
March	6,763,000	6,221,000	12,000,000
April	8,651,000	7,919,000	12,600,000
May	9,281,000	9,488,000	12,450,000
June	9,296,000	10,577,000	11,150,000
Total	42,468,000	40,075,000	

Hints and Helps for Superintendents



Large size drag-line loading field hopper



Portable hopper for loading gravel cars

Loading Gravel with Drag-Line and Hopper

A PENNSYLVANIA sand and gravel producer has a rather unusual method of excavating his material, which is a river valley deposit and lies under a flat, level surface. Very little stripping is required and this is merely cast to one side.

A very large drag-line excavator, of the type much used in the Mississippi Valley section for levee work, is used. This drag-line is of the full revolving type and travels on rollers with mud sills laid on the ground. A special scoop bucket is used, holding about 2½ yds.

The scoop or scraper bucket is dumped by up-ending it from a tail line, as the view shows, into a traveling timber hopper. This hopper is high enough to allow a 7-yd. contractor type dump car to be spotted under it.

To assist locomotive engineer in spotting the cars a home-made signal device has been arranged. These are vertical straps, painted white, which hang down from the bottom of the hopper and come in contact with the tops of the cars. When the two straps are in contact with both ends of the car it is ready for filling.

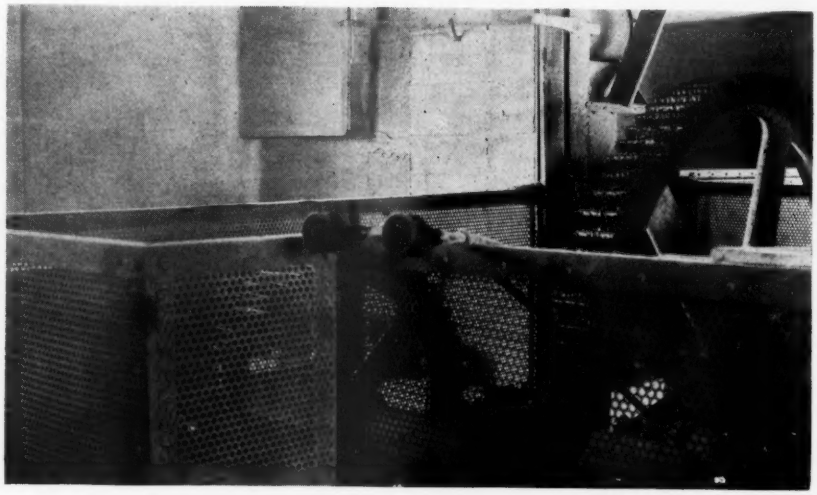
The hopper has a gate opening, operated from one side by a chain. The object of the hopper is of course to prevent dumping the bucket directly into a car, and also to keep the drag-line working while the trains are being switched. The hopper travels on railway rails and is moved by the locomotive or by a hauling line from the excavator.

The device described is at the Brennan Sand Co., Tulleytown, Pa., on the Pennsylvania R. R., just north of Philadelphia, and probably has been noticed many times by travelers in going between Philadelphia and New York.

Safe Oil Cups

THE ILLUSTRATION herewith shows an up-to-date method of protecting and providing for the oiling of the gears on a large size bucket elevator at the new crushing plant of the Giant Portland Cement Co., Egypt, Pa. (described in ROCK PRODUCTS of July 16, 1921). Gears of this type and size are always dangerous to work around.

The grease cups, instead of being where the oiler has to reach by or over the gears, are placed at the outside of the railing, where they are not only accessible but removed from the danger zone.



Safety railing and grease cups on elevator gears

This is a very inexpensive precaution and a very efficacious one.

The general superintendent of the Giant Portland Cement Co. is O. D. Havard. D. C. Findlay was the engineer in charge of the design and construction of the new crusher plant.

Gasoline Locomotives and One-Car Trains

ARE LOCOMOTIVES PRACTICABLE in quarries where the shovel must work head-in on the face, and where the loading tracks instead of looping by the shovel must have dead ends at the face? Such a condition means handling the cars as single units and are not generally considered favorable to the use of motor haulage in quarries of small capacities.

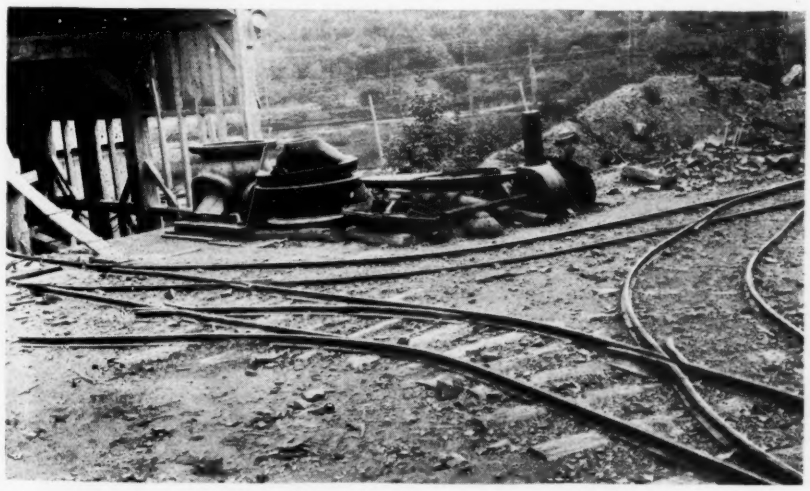
That it does pay to use a gasoline locomotive under such conditions has been amply proved by experience of the Connecticut Quarries Co. at its White Oak plant. This is a quarry and crushing plant of about 600 tons daily capacity, with a very high face, within about 200 ft. of the initial crusher. If conditions ever favored a hand-loading push-car operation they surely do here.

The quarry was operated in that manner for several years. The first improvement was the installation of a revolving type steam shovel. The end-dump cars were still pushed by hand on a level track to the crusher. Probably there is not more than 500 ft. of track in the whole quarry and the economy of motor haulage was doubted.

However, labor got scarce and high and the locomotive was installed. Results have in every way justified the change. Probably no other two-car quarry has as much capacity. With a loading track on each side of the quarry one car is always being loaded, while the other is in transit to and from the crusher.

Quarry face with two dead-end loading tracks

Locomotive with car in dumping position



Y track for switching at the crusher pit

The locomotive backs the car out on a Y so as to push it end-on to the crusher. It comes back on the same Y and places the car on either loading track and then switches over to the other track and pulls out the loaded car. The whole operation takes about as long as it requires to fill the 7-yd. car.

The operation could be varied and the efficiency on a longer haul increased by providing a middle track for a couple of empties, which could be spotted at the shovel by a car puller operated from the shovel. The locomotive could handle two-car trains at the crusher without difficulty with a little extra switching.

The Connecticut Quarries Co. operates quarries and crushing plants at Middlefield, Meriden, Rocky Hill, Plainville and Mt. Carmel, Conn. The views shown are of one of the two plants at Plainville. Albert L. Worthen is vice-president in charge of operation.

Gravel for Gravel Roads

No. 5—Geology of Sand and Gravel Formations and Why Some Gravels Are Better for Gravel Roads Than Others

GRAVELS RICH IN GRANITE pebbles, like most of our New Hampshire gravels, and esker gravels generally are liable to be poorly graded, carrying on the one hand too much sand, and on the other too many cobbles. In such cases a suitable mixture may be obtained by selective processes or screening at the pit, or by crushing the run of the bank so as to convert the cobbles into additional metal. The *shape of the stones* in the aggregate affects the behavior of the mass as it compacts under traffic.

Gravel pit in esker showing variety of grades of gravel

Angularity favors compacting, since somewhat angular stones, once wedged against one another, are likely to stay fixed, instead of slipping or rotating in contact with their neighbors, as differential pressures are brought to bear on them. A certain degree of permanency in location of points of contact is necessary to promote chemical cementation, which ultimately completes the bond in the road. Some gravels, particularly hard, freshly rolled stream and beach gravels, in which the pebbles are nearly spherical, do not lie still long enough to become cemented. Flatness of stones is usually undesirable since it affords chance for shearing between them.

Since the matrix of the mass ultimately consists not only of the sand and clay in the original mixture, but also of the fragments ground or crushed, under traffic, the *durability of the stones* enters into the binding qualities. A slaty gravel consisting wholly of rolled stones from a stream bed, without any matrix when it is first laid down, on the road, may quickly produce its own binder as the stones chip or splinter or grind to mud, which rain and dry weather work into a paste that promptly penetrates all voids.

Gravels consisting of harder rocks, likewise, furnish their own fine aggregate, although more slowly. It is clear that a quickly packing slaty gravel, while suitable for a lightly traveled road or driveway, may be wholly unfit for a road that carries heavy traffic, because the gravel lacks that strength which the traffic demands. Local roadbuilders do not always appreciate or heed this point, preferring to use a gravel which will "come down" rapidly instead of a more durable gravel which is slow to pack. In the long run, of course, the more durable gravel is more economical, although it may lie loose on the surface for a season or two before it gives entire satisfaction.

Cementing by chemical action, in the mass, as it is wet and dried, over and over again, depends partly upon the *solubility* of the particles in the mass. Gravels rich in lime carbonate are quickly attacked by ground water which soaks down through the gravel, carrying dilute acids which dissolve the lime carbonate; and this is presently re-deposited in the adjoining spaces, making a real chemical cement. The solution and precipitation are accomplished, in general, by the wetting and drying of the gravel. Even without these fluctuations in the strength of the solutions, chemical solution may go on, at points of contact between particles, under pressure, while chemical precipitation or crystallization from the solution is taking place between these points of contact, in the voids.

The effect of these chemical activities, then, is to convert the porous mass of gravel, in the bank, or in the road, to a more or less firm "conglomerate." Some of the gravels of Eastern Vermont are so rich in lime carbonate that they have been deeply though irregularly consolidated while still in the bank. When laid down on the road and packed by traffic, particularly in wet weather, these gravels "set" almost like Portland cement; and although the stones in them are very soft, the compacted gravel makes a road that holds up, under traffic, much better than some roads built of stronger material.

The presence of lime carbonate is easily detected by pouring a few drops of dilute hydrochloric acid on the road, which makes the carbonate give off bubbles of carbonic acid gas. Careful quantitative analyses, in the laboratory, of samples taken from the actual surface of the road show that this surface, although exposed to weathering, is as rich in lime carbonate as the original gravel. Downward percolation of rain through the structure has not removed lime carbonate from it, but has rather carried it into the voids between the pebbles, and deposited it there.

The cementing of gravels by *colloids* is less thoroughly understood, and many theoretical problems are involved. The grinding of gravel under traffic produces much impalpable powder. Some of this has peculiar adhesive properties which class it as "colloidal." Methods for determining the

The source of granite boulders and pebbles

colloidal content of gravels are being studied out, with the hope and expectation that it will eventually be possible to measure the binding quality of a gravel by this means.

Tests of Quality—Of the qualities discussed in the foregoing pages, the one for which there is the most satisfactory test is durability. The method used in all cases, thus far, is a modified form of the standard Deval abrasion test. Five thousand grams of washed and dried pebbles, varying in size from those passing a two-inch screen to those retained on a half-inch screen, are put, together with six one-pound steel balls, into a cylinder, where they are revolved and thrown from end to end, for about five hours, making 10,000 revolutions. Of the material remaining, that which is retained on a sieve with 16 openings to the inch is washed, dried, and weighed. The loss found by comparing this with the original 5,000 grams is called the "per cent of wear."

The grading of gravel—that is, the distribution of sizes in the mixture, though obviously important, cannot be satisfactorily judged in the laboratory. Gravel banks of all kinds, especially the common kames and eskers, show such variations in composition vertically and horizontally that a sample, however conscientiously collected, does not represent the material likely to be drawn from the bank in successive loads.

Even half a dozen samples from a single bank, if collected at one time, may fail to give a fair average of the material that lies 50 feet back in the bank, within range of the needs of the present job. Moreover, the thorough grading of samples, even with machinery specially devised for it, involves time and expense that is not justified by results.

The only way to judge the grading of a gravel is to study it closely at the bank, where as much material as possible is exposed to view, and where there may be clues to changes within the bank. If such examination reveals the fact that parts of the deposit are too sandy or too cobbly, there is no practical solution of the problem but to have a vigilant inspector at the bank, who can insist on the right material being selected or a satisfactory mixture being obtained. It is a field problem; not a laboratory problem.

Dr. G. J. Fink Joins Staff of the Lime Association

DR. G. J. FINK, formerly of the Hooker Electro-chemical Co., and a graduate of Cornell University, has recently been added to the technical staff of the chemical department of the National Lime Association.

Dr. Fink is an experienced research man and it is intended by the association to make all of his time available for research work on lime.

Mississippi Railways Fight Rate Reductions

State Railroad Commission Enjoined from Enforcing New Sand and Gravel Mileage Scale

ON JULY 6, the Mississippi Railroad Commission issued an order reducing freight rates on sand and gravel used in highway construction and instituting a mileage scale to be effective July 20. From the official text below the proposed scale of rates apparently did not include *washed* or *screened* gravel, in other words it covers merely sand and gravel for gravel roads.

The various railways affected immediately applied to the Federal Court for an injunction to prevent enforcement of this order. A restraining order has been issued by the court and a hearing will be had before Federal Judge Foster at New Orleans on August 30.

The full text of the Mississippi Railroad Commission's order is as follows:

This cause came on this day to be heard, all railroads having been cited to appear. Representatives of the State Highway Commission, the gravel and sand producers and the carriers appeared and all were heard.

It appears from the evidence and facts obtained by the Commission's investigation that, with the exception of certain rates of the Mobile & Ohio and Columbus & Greenville Railroads, the present rates of the Mississippi lines are excessive. The Mississippi rates are higher than the intrastate mileage scales in certain states, and are materially higher than the rates applying between many points in other states on both intrastate and interstate traffic, where traffic density is lower and conditions generally are less favorable than obtain in Mississippi.

Representatives of the State Highway Commission and gravel and sand producers testified that in many counties in the state money obtained from the sale of bonds voted by the counties for the purpose of constructing public highways is being held in banks and the county officials refuse to proceed with the construction, on account of the present excessive freight rates.

The Commission believe that it would be to the interest of the carriers, as well as of the shippers, to establish more reasonable rates, as it would result in a large increase in the movement of gravel and sand, and they also believe that substantial reductions might be made in the present rates and they still would be highly remunerative.

Having carefully considered all matters and things involved the Commission are of the opinion and find that, excepting certain rates of the M. & O. and C. & G. railroads, referred to above, the present rates on gravel and sand used in the construction of public highways in Mississippi, are excessive and should be reduced. It is therefore ordered that all railroads operating in the state shall establish and apply between all points within the State of Mississippi on gravel, not washed or screened, and sand, when consigned to Federal, State, County or Municipal officers, or their bona fide agents, rates no higher than the following, which we find to be fair and reasonable:

	1	2
For 15 miles and under	40	36 per ton
For 30 miles and over 15 miles	50	45 per ton
For 75 miles and over 30 miles	60	52 per ton
For 125 miles and over 75 miles	70	60 per ton
For 160 miles and over 125 miles	80	68 per ton
For 180 miles and over 160 miles	85	68 per ton
For 200 miles and over 180 miles	90	72 per ton
For 220 miles and over 200 miles	95	76 per ton
For 240 miles and over 220 miles	100	80 per ton
For 260 miles and over 240 miles	105	84 per ton
For 280 miles and over 260 miles	110	88 per ton
For 290 miles and over 280 miles	115	92 per ton
For 300 miles and over 290 miles	120	96 per ton

That rates to apply on gravel and sand as described above, carload minimum weight 10 per cent less than marked capacity of car.

Column 1. Rates to be applied over a single line of railroad or over two or more railroads under the same ownership, management or control.

Column 2. Rates to be applied over a single line of railroad or over two or more railroads under the same ownership, management or control, in movement over two or more railroads not under the same ownership, management or control.

Recent Cuts in Illinois Concrete Road Prices

A REDUCTION in the price of portland cement, which will make a difference of $476 per mile of 16-ft. concrete road was announced recently by the Director of Public Work of Illinois, in connection with the opening of bids for several sections of state-aid roads.

This reduction will average in 96 counties, 14.4 cents per barrel, it is figured. It is not nearly as much as the administration had hoped for and officials declared they are determined to still lower this figure.

The bids, with two exceptions, where the grading is heavy and the hauls unusually long, were well under the maximum cost of $30,000, above which the governor has said he would not permit in the building of concrete roads.

One bid for a fraction over 14 miles, went as low as $19,722.40 per mile, exclusive of cement. The bidder was Jansen & Schaefer of Pekin, Ill. Deductions from this sum, permitted by the bidder, including personal bond and the addition of the cost of cement will make the cost of the road to the state $25,700 per mile complete. This is one of the lowest bids yet received.

Sand Settling and Sand-Settling Devices

No. 5—Sand Collectors

By Edmund Shaw
Allen Cone Co., El Paso, Tex.

SAND COLLECTORS are the first forms of settling devices to be described, since they are the simplest. Figs. No. 1 and No. 2 in the issue of July 2 show sand collectors of the whole current and surface current types, both of which are found in common use.

As sand collectors have no continuous discharge the feed has to be shut off before the collected sand can be removed. Hence, they are intermittent in their action, loading at one period and discharging at another.

The tendency today is to replace intermittent devices and processes with those which are as nearly continuous and automatic as possible. For this reason sand collectors are being set aside for those devices which have a continuous discharge, and which are thus adapted to the modern flow sheet in which the material is kept in uniform, continuous movement from the crude to the finished product. Such a movement is the very basis of modern industrial engineering.

Settling Clay With the Sand

Considered only as settling devices, sand collectors have another serious defect, which is the settling of clay along with the sand, where much clay is held in suspension in the feed water. The reason for this is easy to understand. As the sand collector must contain considerable space for storage, at the start there is a large dead space filled with clayey water, and this clay settles slowly along with the sand. With coarser sands this action is not so marked, the fall of the sand displacing the clay and forcing it upward. With fine sands the action is very marked, the fall of the fine sands increasing the falling rate of the clay particles. With very fine sands, 200-mesh and finer, it is impossible to make a separation of the sand and clay in a sand collector, the settled product being a very dirty mixture of clay and fine sand.

The writer has seen attempts to recover very fine sand, in both the phosphate rock and glass sand industries, which were complete failures on this account. So much clay came down with the sand (in one case this was 27 per cent by weight) that the product was quite unmarketable. Attempts to wash the clay from the sand resulted either in washing away the greater part of the sand or in retaining the greater part of the clay. Special methods had to be devised to obtain this fine sand in a clay-free condition.

Use of Sand Collectors as Preliminary Settlers

Despite the disadvantages which have just been mentioned, sand collectors have a considerable use, and they may be satisfactorily employed where too much clay

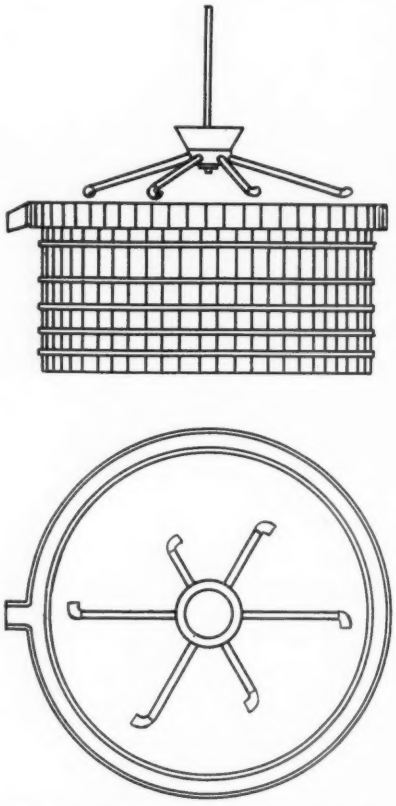


Fig. 7—Butters distributor and tank

is not present or as preliminary settlers. The last named use seems to be almost standard practice in the washing of glass sand.

In glass sand plants the sand collectors are bins or tanks, which receive the crude product either as it comes from the rolls or is pumped from the pit. The greater part of the clay goes off in the overflow of the bin, but the settled sand is too dirty to be marketable. So the settled sand is sluiced to some form of continuous discharge machine, from which the overflow carries off most of the remaining clay, although sometimes another washing has to be given.

Forms of Sand Collectors

Sand collectors are of many forms, from a mere hole in the ground, used as a sump, or catch pit, to the very elaborate arrangements used for collecting "concentrates" (which are sands of heavy, copper-bearing minerals) in the big copper mills of the Southwest. These consist of large, circular concrete tanks, fitted with filter bottoms and vacuum pumps for draining the sands, and conveyor-belt systems for loading them into cars. A traveling crane is usually placed above a line of such collectors to use in pulling the heavy, conical plug that closes the central discharge hole, and to aid in the work of discharging.

Dams

Dams are also sand collectors, but as their purpose is to recover the water run from the plant rather than the sand they are rather outside the scope of this article. It might be mentioned that the usual problem in connection with dams is that of distributing the heavier sands so that these will not settle in one place, near the inlet. One good way to secure distribution is to run a flume supported on trestles through the center of the dam site. Branch take-offs provide a means of distributing the heavy solids over practically the whole area of the dam.

Recently a method of dam building has come into use which employs a form of automatically discharged cone to remove the heavy solids and pile them up to form the dam itself.

Sumps and Catch Pits

These are mere holes in the ground, generally lined with timber or concrete to prevent caving. The sand is pumped to them until they are full and then it is excavated by a grab bucket on a locomotive or traveling crane. Such settling arrangements are low in first cost but rather expensive to operate. At least two handlings with the crane are usually needed to get the product on the cars.

The use of sumps is sometimes justified where it is important to save head room, and also in plants of a temporary kind where the first cost must be kept down.

Bins, Silos and Settling Boxes

These are different names for what is practically the same thing, a square or oblong sand collector, usually set up from the ground to allow the settled sand to be spouted to trucks or cars. If a sufficient depth of sand can be accumulated above the spout it is possible to fill and empty at the same time, thus turning the sand collector into a continuous discharge device.

Bins and silos are so well known that space will not be given to their description. Some forms of sand collectors used in the mining industry will perhaps have the merit of greater novelty to the readers of Rock Products.

Butters Distributor and Tank

Of these forms perhaps the most ingenious is the Butters arrangement, long

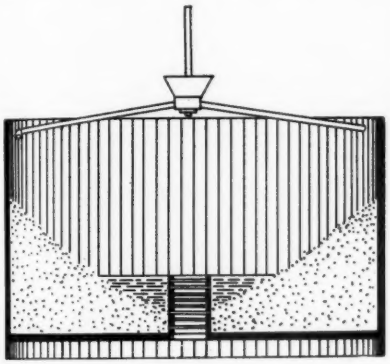


Fig. 8—Hamilton's form of sand collector

used to catch the sands from gold and silver mills for treatment with cyanide. The tank is an ordinary circular tank of any desired depth, usually provided with a rim overflow. The distributor has a circular, cast-iron bowl which receives the feed stream. Pipes of unequal length distribute the feed to different parts of the tank. At the end of each pipe is a bent nozzle, turned at right angles to the pipe, and as the stream issues from the nozzle it imparts its force to the pipe, causing the distributor to revolve, as the common lawn sprinkler is caused to revolve by the force of the issuing water. In this way the sand is fed uniformly to all parts of the tank.

It requires some skill to adjust and operate the distributor, but the results obtained are worth it, the tank not only being filled in all parts but with an even grade of sand throughout the charge. The big sand tanks at the Homestake mine were 50 ft. in diameter and 13 ft. deep, holding nearly 1200 tons each. They were filled by Butters distributors to within 4 in. of the top, and so even was the distribution that the sand required only to be raked over lightly to be perfectly level.

Hamilton's Form

This form of sand collector was designed to remove clay more thoroughly than could be done by the ordinary type. As shown in the cut, the distributor has but two arms and these are so long that they throw the feed to the side of the tank where the sand builds up, sloping to the center. The overflow is taken off through a central pipe which is built up with rings as the tank is filled, to prevent sand from being carried out.

This collector is interesting because it employs the method of huddling, mentioned in a previous issue, rather than settling of the ordinary sort. It gives a clean sand but requires pretty constant attention to keep the overflow at the right height, and it is not suitable for use with large quantities of feed water.

Joplin "Scow" Tanks

These are surface current sand collectors and a great many of them are in use in the zinc mills around Joplin, Mo., for collecting the sands from the jig tailings. An isometric diagram is given in Fig. 9. The discharge is by sluicing to the low corner shown. The feed is fed in lengthwise of the tank.

Discharge of Sand Collectors

A number of methods of discharging the settled sand are used with sand collectors. Sluicing out is the commonest method, where the sand is to be rewashed or given some chemical treatment. For discharging the sand after draining, the use of a great bucket and crane has been mentioned. Another method is to shovel out either to a belt conveyor or a car through doors which may be opened from below the tank, or through discharge orifices fitted with large, conical plugs.

The most elaborate machine for re-

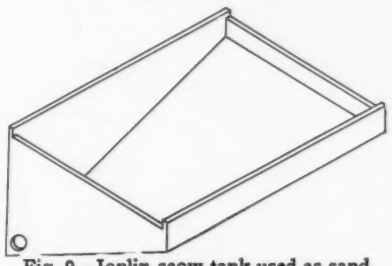


Fig. 9—Joplin scow tank used as sand collector

moving settled sand, of which the writer knows, is the Blaisdell excavator, once in considerable use in the mining industry. It consisted of revolving arms bearing disk plows that cut the sand and moved it along to a central discharge. The first cost of such a machine was very high, but the operating expense was low enough, being about a cent a ton for power, attendance and repairs.

(To be continued)

Moroccan Phosphate Beds

Wealth of 1,400,000,000 Tons of Commercial Phosphates Available

PHOSPHATE BEDS of Morocco are among the most important in the world. They cover over 1,000 square kilometers and form a triangle, limited on the south by the "Oued" Oum-er-Rbia, to the east by a line starting at the confluent of the "Oued" bel Kherraf ending at the "Oued" Zem, to the west by a line starting at Mechra-ben-Abbon ending also at the "Oued" Zem. The bed does not seem to go further north than the railroad from Casablanca to "Oued" Zem. At its broadest, between El Boroudj and Zem, it measures 75 kilometers.

The number of alternating layers is greater in the south where they average 30 meters in total depth with six layers than in the north where they average 20 meters in total depth with three layers. The alternating factor has been caused by erosion and it is this erosion which has made the neighboring land so rich in agricultural possibilities. Some of the phosphate beds of the north are only 50 centimeters thick and are, for this reason, impossible to exploit industrially but the majority measure from 1 to 5 meters, some beds being 8 meters thick. As the thickness of the beds varies, so does the richness of the phosphate obtained, it showing, on analysis a minimum of 49.60% phosphate in the neighborhood of El Boroudj and rising to a maximum of 80.75% in the neighborhood of Zem. The average for the Tadla, 68% pure phosphate, is equal to the average of the Redeyef, region in Tunis, and is slightly inferior in quality to the average in Florida.

Conservative estimates of the total commercial phosphates available in the Moroccan beds places it at 1,400,000,000 tons. The importance of the beds of France is made clear by the following figures: World phosphate production in 1913 totalled 6,850,000 tons of which 2,500,000 tons were furnished by French Africa and 3,150,000 tons by the United States of America. With the development of the Moroccan beds, France will be able to place rich phosphate in any section of Europe at a considerably lower price than American phosphate now costs. It is for this reason that concessions for the development of the phosphate beds of the Tadla are being eagerly sought and it is for the same reason that the Sherifian Government has reserved to itself a portion of the profits which are to be derived from the working of the beds.

Centerville, Iowa, Gypsum Plant

Centerville Gypsum Company Operates Mine 550 Feet Deep—How Serious Obstacles Were Overcome

ONE OF THE MOST INTERESTING gypsum deposits in the United States and one that, perhaps, has had no parallel in the way of obstacles in the path of its development, is located at Centerville, Iowa, now owned and operated by the Centerville Gypsum Co.

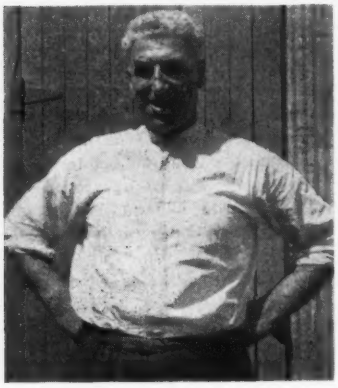
Plant of the Centerville Gypsum Co., Centerville, Iowa

History of Deposit

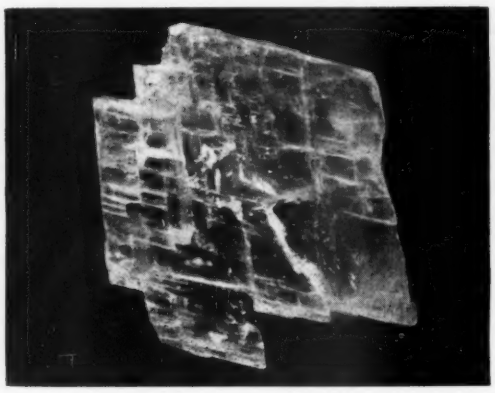
The history of this deposit, according to the U. S. Geological Survey, dates back to 1910. At that time the Scandinavia Coal Co. had been operating a coal mine at Centerville, and while prospecting for coal on its property, discovered a vein of gypsum rock below the coal. The driller's log of the Scandinavia Coal Co. hole shows that gypsum and anhydrite were penetrated between the depths of 537 and 547 ft. below the surface. Analyses made by the Iowa State College proved that the upper 5 ft. of the difference between 537 and 547 ft. was anhydrite and the lower 5 ft. gypsum. The gypsum was topped by 14 ft. of limestone and below it was 2 or 3 ft. of bluff dolomitic limestone, beneath which was shale.

Soon after the discovery of gypsum in this hole, some of the citizens of Centerville subscribed sufficient funds to drill two additional holes, so as to determine the extent of the deposit. One hole was drilled 1,600 ft. southwest of the original hole and after drilling to a depth of 563 ft. neither gypsum nor anhydrite was found. A third hole was drilled 1,638 ft. northwest of the original hole and after drilling to a depth of 572 ft. below the surface, gypsum was discovered. It proved to be 19 ft. thick and of fine quality and essentially free from impurities. Just beneath the gypsum was a gray sandy shale, which was penetrated for only 1 ft.

The Centerville Gypsum Co. was then formed and a shaft was sunk close to the original or "Discovery" hole. The shaft was started about July 1, 1912, and gypsum was reached about Sept. 1, 1913. The shaft was sunk to the rock beneath the gypsum



Jacob Ritter, president



Selenite from these mines is very clear and transparent

Grant Venell, general manager

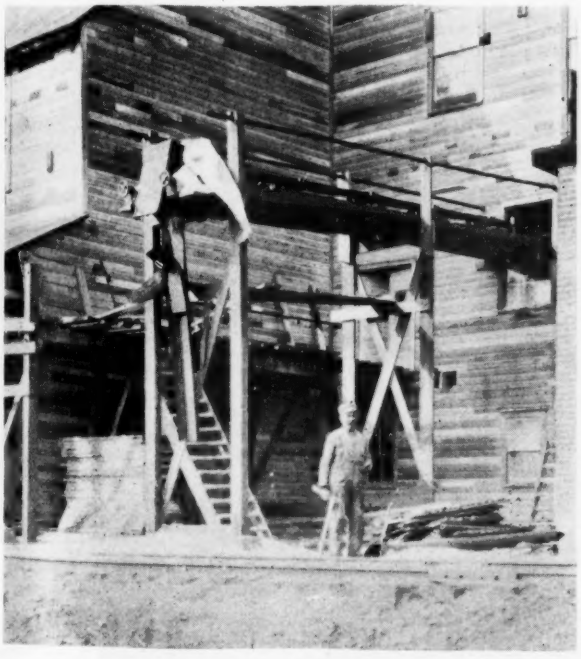
and is 14 by 7 ft. in cross-section and has three compartments. Gypsum 13 ft. in thickness was reached at a depth of 533 ft. In the eastern part of the shaft the gypsum is free from anhydrite but in the western part anhydrite is associated with the gypsum.

3. View in mine showing gypsum vein—limestone roof overhead

Obstacles Encountered

When the shaft reached a depth of 528 ft., only a few feet above the gypsum, the progress was greatly hampered by large quantities of artesian water that entered the shaft. The artesian water, about 3,300 gal. per hour, comes from a porous limestone about 4 ft. thick which lies on the gypsum. It rises to a height of about 200 ft. The operators at that time could not solve the problem of handling the water and no further work toward opening the mine was done until 1917, when the water was successfully sealed out of the shaft.

At first the company used to pump the water for a continuous period of 24 hours using a 7-stage centrifugal, 62-h.p. pump, with a capacity of 200 gal. per min. At the time of the writer's visit the pump was only operated for 10 hours and the writer was recently informed that even this pumping time had been cut down. It is believed that eventually the pump will only have to be operated a few hours a day to take care of the natural flow of



4. Belt conveyor for loading raw rock gypsum

10. Hair picker and plaster bins

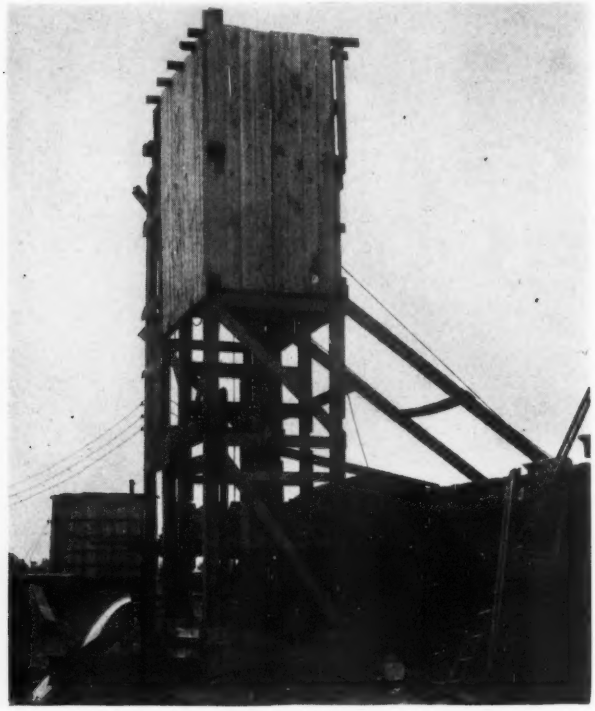
water.

Character of Deposit

The rock gypsum is of a white crystalline character and breaks into irregular shaped lumps. It is distinctly friable and is easily crumbled to fragments resembling pure white granulated sugar.

The presence of selenite in the mine is rather interesting. Selinite is calcium sulphate ($CaSO_4$) or gypsum without the water of crystallization. The selenite is very clear and transparent and has the characteristic parallel cleavage. Fairly large pieces are found free from any impurities. Selenite has no particular use, but it is regarded by some manufacturers of Portland cement to be practically as serviceable as gypsum.

At the present time the company is driving entries into the mine, but eventually it will be worked by the room and pillar method. The gypsum bed is from 10 to 22 ft. in thickness. The roof of the mine is composed of 100 ft. of limestone, thereby making timbering unnecessary.



2. Tipple and mine shaft. Note flow of water from mine

Mine Operation

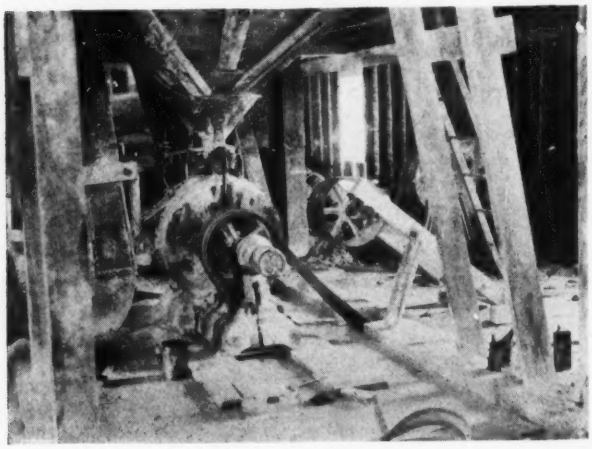
The drilling is done by electric drills cuting a 2-in. hole, the depth of the holes never exceeding 8 ft. They are filled with 20 per cent gelatine dynamite for blasting. Later on when additional escapeways have been made, black powder will be substituted for dynamite, since it is of sufficient explosive effect for the solid stone.

The material is hand loaded at the face into one-ton mine cars and is pulled by a mule over 36-in. gauge tracks to the shaft. The mine cars are hoisted 550 ft. to the surface by a steam hoist. The receiving station at the surface is immediately above the initial crusher and the cars are dumped into this hopper, the rock then being broken up by a 24x36-in. jaw crusher reducing the size to 2½ in.

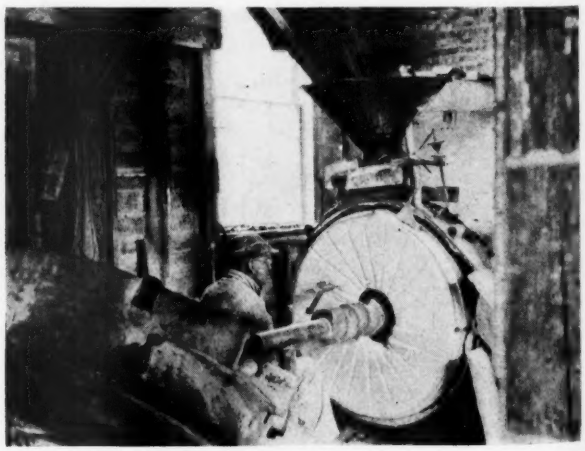
Crushing and Pulverizing

The rock is reclaimed from the jaw crusher by a bucket elevator and deposited in a hopper feeding the recrusher, which in this case is a rotary crusher. The rotary crusher is similar in appearance to the gyratory crusher but has a coffee grinder action, instead of an eccentric action. That is, the spindle does not oscillate and does not have a crushing force, but because of the projections and grooves it has a grinding action only. This type crusher is admirably suited for gypsum, since it is of an extremely soft character. The rock is reduced to ½-in. size by this crusher and is reclaimed by a bucket elevator and deposited in a storage bin of 60 tons capacity.

As the stone is required it is drawn out of this storage through bin gates and fed into two vertical burr mills. The material is fed into the center of the machine and through the top. The pulverizing is done between two stones in the mill. One of the stones is stationary while the other revolves. Radiating grooves are cut in the grinding surface of each stone and as they become smooth the stones must be roughened again. Extra stones are kept on hand so that no time will be lost in dressing. Each mill is run by a 40-h.p. a.-c. slip-ring motor. The speed of the mill is 600 r.p.m.



5. Feed for burr mill



6. Dressing stone on burr mill

Calcining

The burr mills discharge into a hopper feeding a bucket elevator, which discharges into a 12-in. r. h. screw conveyor, approximately 60 ft. long, discharging in turn into the bins over the calcining kettles. This plant has two 40-ton kettles. The kettles are constructed of boiler plate and are insulated on the outside with brick and are lined with firebrick on the inside. The interior dimensions are 8 ft. diameter and 10 ft. depth. The kettles are direct fired from furnaces underneath, which are equipped with shaking grates. Several flues are provided for in the bottom of the kettle so that considerable of the hot gases pass through these, thus increasing the burning efficiency.

In order to prevent burning the gypsum while it is being calcined, a constant motion is provided for in the kettle. This is accomplished by a large mechanical agitator which consists of a gear-driven vertical shaft to which is attached a curved cross-arm bearing stirring paddles. The agitator revolves at about 15 r.p.m.

The time of calcination is somewhat dependent on the moisture in the gypsum rock, as dryers are not employed to drive off excess moisture in this plant. However, it takes about one hour to fill a kettle and the average time for calcination is from 2 to 2½ hours. Calcination of the rock at this plant usually takes place at about 315° F. The company draws all of the gypsum out of the kettle. This is known as first-settle. Second-settle material is not recovered at this plant.

After the material has been dehydrated or calcined to the desired point, the finished product is discharged into concrete hot pits, 10x20x12 ft., where it is allowed to cool. The material is drawn out of the pits by three 6-in. screw conveyors discharging into a 12-in. cross screw conveyor 40 ft. in length. This screw discharges into an elevator boot, from which it is elevated to a height of 30 ft. and discharged into another 12-in. screw conveyor 20 ft. long, discharging to storage bin.

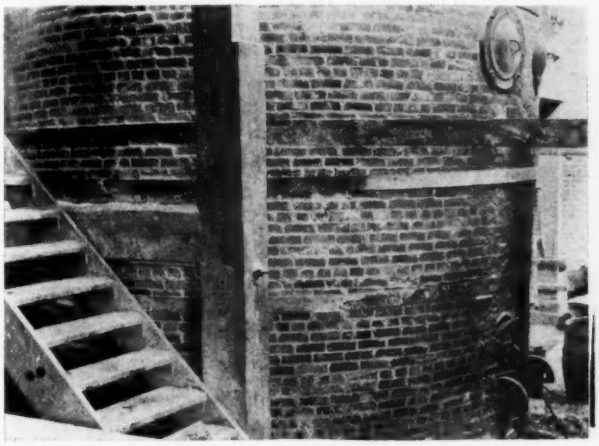
Mixing and Packing

The product in the storage bins is practically pure plaster of paris. Approximately 85 to 90 per cent of it will pass through 100-mesh and when water is added to it, it will set in six to eight minutes. It is therefore necessary to add some material to this plaster to retard the settling. In this plant the retarder is an organic material and the fibre consists of hair.

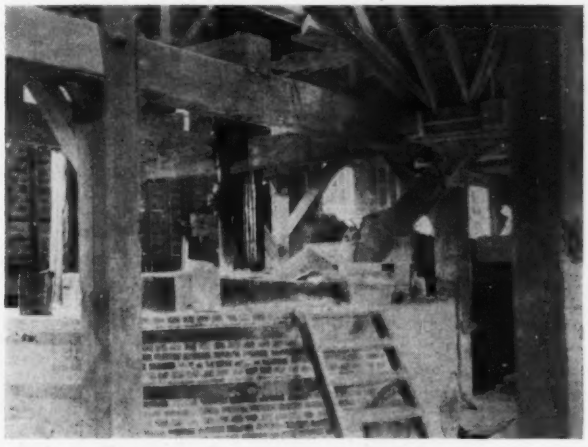
Immediately beneath the storage bin is a mixing hopper into which a weighed amount of plaster is run by gravity and here retarder and hair is added. The quantity is somewhat of a variable factor, but usually 2 lb. of retarder and 7 lb. of hair is added to a 1,500-lb. charge of plaster. The hair is brought to the plant in tight bales and must be picked before being used. The hair picker consists of disk mounted on a shaft at the center rotated by hand. When a piece of hair is dropped into the machine it is caught by the teeth on the disk and shredded and thrown into the hair bin.

A screw in the bottom of the hopper mixes the materials and the charge is then dropped by a lever into the mixing machine above the packer. From here the material goes direct to the 4-bag, flour-type packer. There are two such machines here. The plant has a capacity of 65 tons finished plaster per day.

The power for the plant is furnished from two water-tube boilers, one 150-h.p. and one 180-h.p. generating 125 lb. of steam for a 150-h.p. 18x36-in. Corliss engine. The hoist for operating the shaft elevator is also steam driven.



7. Lower part of kettle showing shaking grate



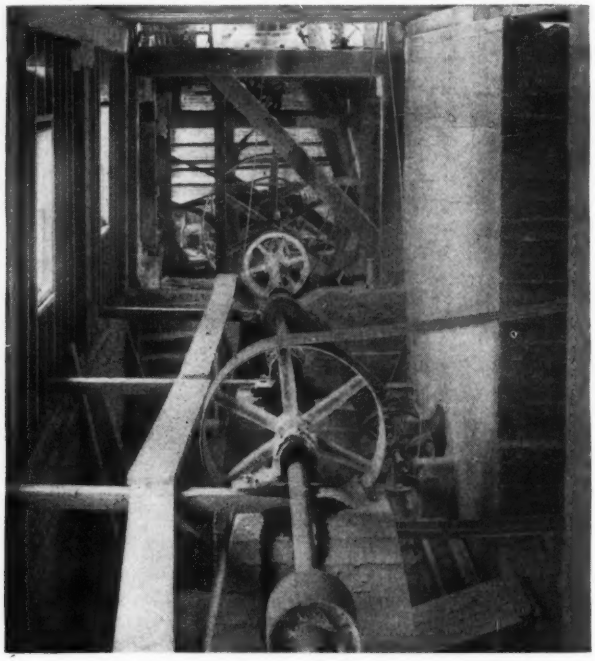
8. Top of kettles showing agitation drive

11. Plaster mixers and packers

Organization

The company markets the following forms of gypsum: Gypsum rock for cement manufacture, land plaster, used for agricultural purposes, and gypsum plaster for building purposes.

The company was incorporated in 1912 but actual operation of the plant did not begin until 1919. The president of the company is Jacob Ritter; vice-president, Andrew Venell; secretary, Otto Pierson; treasurer, G. M. Barnet; general manager, Grant Venell, and superintendent, J. S. Molloy.



9. Hot pits and cross screw conveyor

Gypsum in Stables

THE GYPSUM INDUSTRIES ASSOCIATION, 111 West Washington Street, Chicago, Ill., has just issued an interesting little folder on "Agricultural Gypsum Holds Nitrogen Which Means Money Saved."

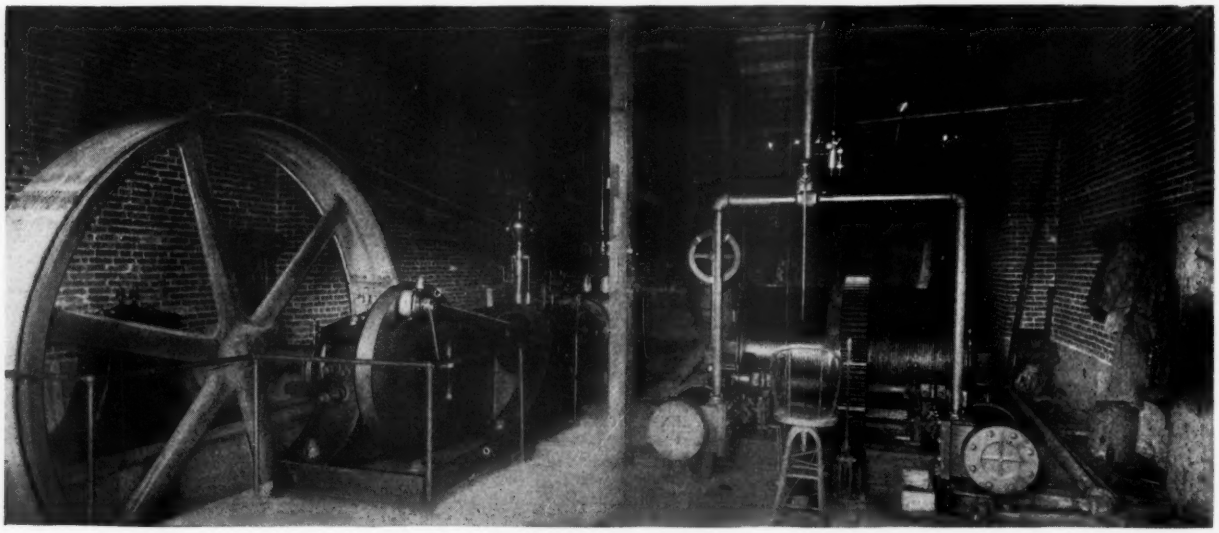
Among other things this folder says: "The advantage of using gypsum with manure is through the property it has of recombining the easily lost ammonia (ammonium carbonate) into a firmly fixed salt of ammonia (ammonium sulphate). Agricultural gypsum itself is composed of two important and directly available plant foods—calcium and sulphate sulphur.

"Gypsum is sprinkled on the barn floors, gutters or concrete manure pits and in this way arrests the loss of nitrogen contained in the urine. It is recommended that sufficient litter be included to merely absorb the urine. Gypsum is also applied to the solid excrement. Usually a daily application of three to five pounds per animal is specified. The spreading of gypsum over the manure pile is considered a good practice; 100 to 120 pounds should be employed per ton of dung.

"Manure should be packed in a place protected from both sun and wind. This precaution checks undesirable fermentation. The manure should be sheltered by a good roof so as to prevent the leaching of the soluble plant food. It should be borne in mind that a certain degree of moisture is favorable to desirable fermentation processes and the retention of nitrogen by gypsum is most effective under the same conditions. The loss from bad handling of manure amounts to at least $800,000,000 a year.

"Gypsum, unlike some forms of preservatives, does not affect the hoofs of animals. Gypsum improves the sanitary and living conditions of the animals. It also improves the working conditions of the barn man. Milk absorbs odors like ammonia. By paying attention to the manure pile other more expensive means of maintaining the fertility of the soil may be deferred. Manure is highly organic and when preserved with gypsum forms in the soil humus of lasting qualities."

Copies of this booklet can be obtained from the Secretary of the Association, H. H. Macdonald, at the address given above.



12. Power and hoist

Practical Chemistry for Lime and Cement Manufacturers

Calcium Silicates in Glass—In the Manufacture of Portland Cement

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, Baltimore, Md.

THE NORMAL CALCIUM SILICATE has the composition $CaSiO_3$ or $CaOSiO_2$ and is composed of one molecule of silica united to one of lime. It exists free and pure in nature as the mineral *wollastonite*, $CaSiO_3$. This is a rather rare mineral, but calcium silicate itself is an important constituent of many of the complex silicate minerals and rocks. It is one of the chief constituents of glass, which is of a mixture of silicates.

Both bottle and window glass are usually fused mixtures of calcium silicate and sodium silicate (lime-soda glass). Sometimes lead silicate takes the place of calcium silicate and potassium silicate of sodium silicate. Lead-potash glass is heavier than lime-soda glass, possesses more luster and is used for ornamental purposes such as "cut-glass" objects.

Lime in the Glass Industry

The lime industry touches the glass industry because lime is an important raw material for glass making. Ordinary lime-soda glass contains from 10 to 15 per cent of lime. Both burnt lime and raw limestone are used in making glass. There is some difference of opinion among glass makers as to the advantages of the two forms and some works use one form and some the other.

Burnt lime has the advantage that the heat necessary to decompose the limestone is saved and the work of the furnace is thus lessened. On the other hand, if limestone is used, the liberation of carbon dioxide when the carbonate is decomposed helps to stir up the mass during the melting process.

Lime materials used in glass making should be low in iron oxide as this colors the glass green. Magnesia is supposed to make the glass hard and more difficult to work, but many American factories use lime high in magnesia without seeming inconvenience.

Silicates in Cement

Calcium and silica also unite in other proportions than that shown above and these other silicates so formed are of importance to the cement manufacturer, as they constitute the principal constituents of portland cement. Di-calcium silicate (or calcium ortho silicate) consists of one molecule of silica united to two molecules of lime and has the formula $2CaO . SiO_2$. Tri-calcium silicate consists of one molecule of silica united to three molecules of lime and has the formula $3CaO . SiO_2$. Di-calcium silicate can be prepared by heating together a properly proportioned mixture of finely ground silica and lime, but the tri-calcium silicate can only be formed when alumina also is present.

Calcium also unites with alumina to form several different aluminates of which two are contained in portland cement—namely, the tri-calcium aluminate which consists of three molecules of lime united to one of alumina having the formula $3CaO . Al_2O_3$, and a somewhat less basic aluminate with the symbol $5CaO . 3Al_2O_3$.

Composition of Portland Cement

Portland cement clinker, in the light of modern research, may be considered as a mixture of three compounds:

$3CaO . SiO_2$, tri-calcium silicate
$2CaO . SiO_2$, di-calcium silicate
$3CaO . Al_2O_3$, tri-calcium aluminate

The other elements present such as magnesia, iron oxide, the alkalies, etc., are impurities, although they all influence the properties of the cement.

When a mixture of finely ground calcium carbonate (corresponding to limestone) and silica and alumina (corresponding to clay), in proper proportions, is heated, the first change occurs at between 1,650° and 1,800° F. when the calcium carbonate is decomposed and the mixture becomes

CaO
Al_2O_3
SiO_2

As the temperature increases the silicates mentioned above are formed and we have

CaO
$5CaO.3Al_2O$
$2CaO.SiO_2$

As time goes on and the temperature of the mass is increased to about 2,600° F. the free lime (CaO) is gradually absorbed by the other two to form the compounds.

$3CaO.Al_2O_3$
$2CaO.SiO_2$
$3CaO.SiO_2$

In a good cement clinker very little free lime will be present. The change $2CaO.SiO_2+CaO=3CaO.SiO_2$ takes place very slowly and it is not practical under present manufacturing conditions to change all the $2CaO.SiO_2$ to $3CaO.SiO_2$.

Of the three compounds mentioned the first or tri-calcium silicate when mixed with water sets, hardens and develops great strength within a reasonable time. The compound di-calcium aluminate reacts very slowly with water and strength is developed only after a long time. The compound tri-calcium aluminate sets and hardens very rapidly but the mass is not particularly strong.

It appears, therefore, that tri-calcium silicate is the desirable constituent of portland cement and consequently the higher the percentage of this present the better. Ordinary cement contains about 36% of tri-calcium silicate, about 33% of di-calcium silicate, about 21% of tri-calcium aluminate and 10% of minor constituents. A greater percentage of tri-calcium silicate is no doubt desirable but the compound is difficult to form and requires that the raw materials be very finely ground, intimately mixed and kept at a temperature of above 2,500° F. for a long time in order to have the combination complete. The percentage of tri-calcium silicate now obtained is about all that can be hoped for under present manufacturing conditions.

The composition of portland cement clinker has been investigated quite carefully by Day, Shepherd, Wright, Rankin, and other workers of the Geophysical Laboratory of the Carnegie Institute of Washington. Those who desire to study the subject more closely are referred to the papers written by these scientists and particularly to the following: "Lime Silica Series of Minerals," Day, Shepherd and Wright, *Amer. Jour. Sci.* (4) XXII, 286. Shepherd. "The Ternary System," $CaO-SiO_2-Al_2O_3$, Rankin and Wright, *Am. Jour. Sci.* XXIX, "Binary System of Alumina with Silica, Lime and Magnesia," Shepherd and Rankin, *Am. Jour. Sci.* XXVIII, 193. "Portland Cement," Rankin, *Jour. Franklin Inst.* 1916, p. 747.

Hardening of Cement

When portland cement clinker is finely pulverized and mixed with water, chemical change takes place and a hard mass is formed. This hardening is due to the

formation of an amorphous (not crystalline) hydrated material on the individual grains. It is probable that in time this amorphous hydrated material crystallizes to some extent. It appears that the crystals so formed are calcium hydrate and some crystalline hydrate derived from the tri-calcium silicate.

It is probable that the "setting" of cement, which takes place a few hours after water is mixed with the cement, is due to the amorphous hydrate formed from the calcium aluminate, while the early hardness is due to the action of the action of the amorphous material produced by the hydration of the tri-calcium silicate and the further hydration of the tri-calcium aluminate. The gradual increase in strength as time goes on is due to still further hydration of these two compounds and also of the di-calcium silicate, which latter hydrates much more slowly than the first two.

(To be continued)

Uniform Quarry Costs

THE BLANKS BELOW are the two sides of a uniform cost sheet prepared by the National Crushed Stone Association. The blanks represent a good deal of study and experience on the part of the executive committee of the association. This form gives in a nutshell the essence of a quarry cost-keeping system, on a basis that is comparable, one quarry with another.

Incidentally, these sheets are being tabulated and summarized for a report at the next annual convention of the association.

Use of Rock Dust in Coal Mines

THE USE of rock dust for minimizing the effect of explosions in coal mines may result in giving the railroads a considerable tonnage they have not heretofore suspected, according to a brief filed by Ralph Merriam in No. 13246, Old Ben Coal Corp. vs. Director-General, as agent, Chicago, Burlington & Quincy Railroad. The complainant crushes shale or other kind of rock to a fine powder, then places that powder in V-shaped troughs at places in the mine shafts so set that any perceptible jar will upset them and set a cloud of dust afloat in the galleries or shafts.

This cloud of dust, it is claimed, has the effect of choking and localizing a mine explosion which would otherwise, on account of the highly inflammable coal dust and mine gases, spread and involve the whole mine. The complainant uses the dust prevention device in its twelve mines in Southern Illinois. So convinced is it that the device is practicable that it seeks reparation on about 80 carloads of the rock or shale dust, moved by it from its mine No. 9 near West Frankfort, Ill., to other of its mines at Christopher and Sesser, Ill. The dust moved between December, 1918, and February, 1920, on a 10th-class rate of $1 per ton. Reparation is asked down to the basis of a rate of 60 cents per net ton. The Burlington, a short time ago, offered to establish a rate of 70 cents per net ton. It and the Railroad Administration did not agree to reparation on the movements during federal control.

In behalf of the complainant, it is contended that the dust should take not higher than the ground or crushed rock basis. Inasmuch as no commodity rates on crushed or ground rock were in effect between the points of movement, the class rate, established under the Illinois classification was the only one that could be assessed.—*"The Traffic World."*

Glass Sand Deposits at Ada, Oklahoma

ADA, Okla., boasts extensive deposits of a good grade of glass sand. So far but one deposit is being worked. This is located at Hickory, southeast of Ada. The analysis of the sand, from tests made to determine its value for glass manufacture, is as follows: Silica, 99.21%; Iron and Alumina, .40%; Moisture, .25%; and Organic Matter, .14%. Limestone of good quality is also available in large quantities near the glass sand deposits. A further advantage is the electrical power and natural gas for fuel that may be had at low rates, so it is claimed.

HEADQUARTERS
NATIONAL CRUSHED STONE ASSOCIATION
405 HARTMAN BUILDING
COLUMBUS, OHIO
A. P. SANDLES, SEC'Y

GROUP COST SHEET FOR 1920

Indicate Your Group by "X"

Make Separate Report for Each Plant.
Mark With "X" Group to Which You Belong.

- ☐ **Group A** Pennsylvania and Maryland and all States lying Northeast of them.
- ☐ **Group B** All States lying West of Pennsylvania, North of the Ohio and East of the Mississippi River.
- ☐ **Group C** All States lying South of Maryland, Pennsylvania and the Ohio River and East of the Mississippi River.
- ☐ **Group D** All States lying West of the Mississippi River.
- ☐ **Group E** Canada and Elsewhere.

What kind of Stone,—Limestone ☐ Trap, ☐ Granite, ☐ Etc. _____

Total tons produced (run of crusher) (1920) _____

Total tons sold (1920) _____

Number of days plant operated (1920) _____

Is operation hand ☐ or steam shovel? ☐ _____

Is power steam ☐ or electrical? ☐ _____

	Based on Total Tons Produced		Based on Total Tons Sold	
	Amount	Per Ton	Amount	Per Ton
Fuel				
Labor				
Material				
Stripping				
Explosives				
Depreciation				
General Expense				
TOTAL				

Read Explanation on Reverse Side

REMARKS:— Unusual or abnormal experience or costs.

EXPLANATION

Fuel Including coal, fuel oil, electricity and freight.

Labor All pay roll or expenditures for labor at plant.

Material All material entering into plant and equipment of all kinds, including office supplies, stable and all other plant purchases, including freight charges on such material.

Stripping Labor.

Explosives Dynamite, blasting supplies, etc., and freight.

Depreciation To include Royalty, Depreciation, Depletion, Obsolescence, Amortization, to equal 10 per cent of investment but not less than 10 cents per ton. (Run of Crusher).

General Expense (a) All salaries and expenses of general administration, selling expenses, interest on borrowed money or bonds, insurance of all kinds carried, taxes of all kinds, reserves of all kinds carried.

(b) Superintendents or clerks and office expenses at quarries **NOT** included, as these items are under items of Labor and Material.

(c) If more than one plant is operated, pro rate this item according to the tonnage of each.

NOTICE

When you report your production cost to us please report any cost items which have been left out of the list which we are sending you so that we may compile same and be ready to report all of them at our next annual meeting. We want this cost sheet to include all and every item of legitimate production cost.

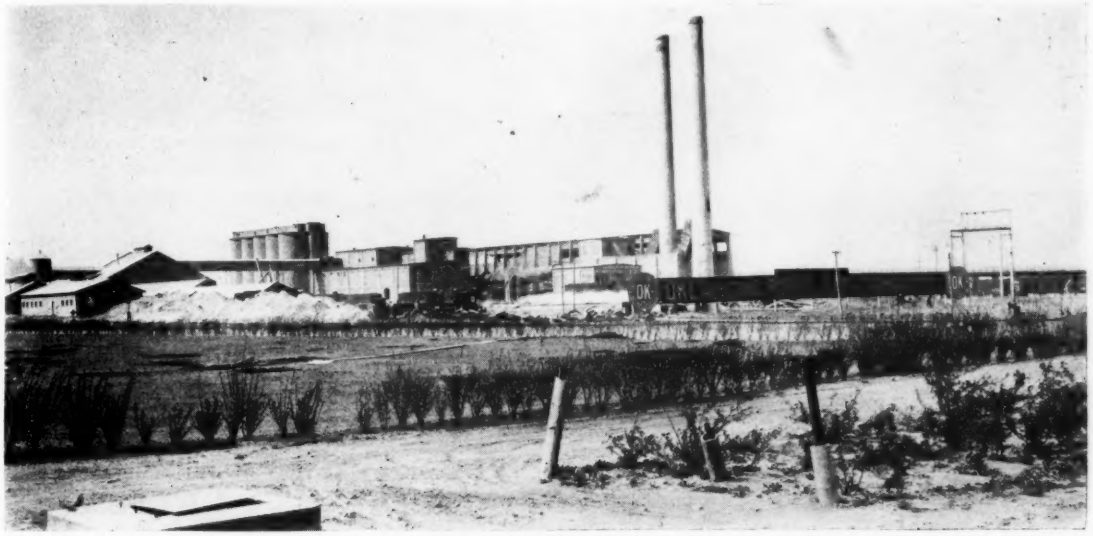
DO IT NOW

The essence of a quarry and rock-crushing plant cost system

The New Plant of the Oklahoma Portland Cement Company--I

Wet Process Plant of 4,000 Barrels Per Day Capacity Erected by Oklahoma Portland Cement Co., Ada, Okla.—Of Latest and Most Modern Design

THE LATEST AND MOST INTERESTING development in the cement industry, in its great program of expansion, has been the completion of the new wet process cement plant of the Oklahoma Portland Cement Co., Ada, Okla. It also marks the entrance of this company as one of the largest individual producers of cement, and as it is fortunately located in a rapidly expanding territory, a good future is predicted for this new plant. The plant embodies the latest improvements in machinery and devices for the manufacture of portland cement.



General view of new plant of Oklahoma Portland Cement Co., Ada, Okla.—Old plant to left

History of Organization

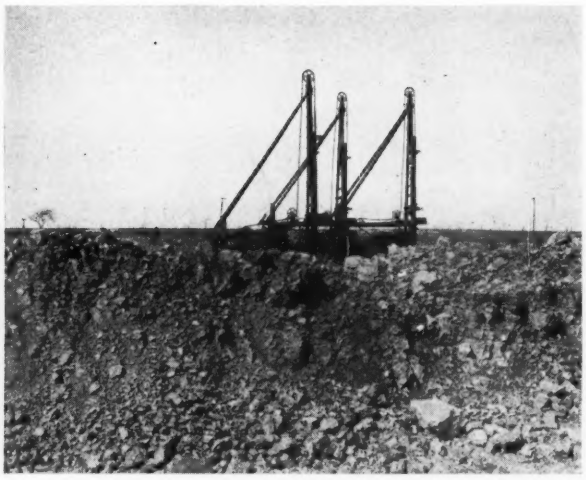
The Oklahoma Portland Co. was first incorporated in 1906, and at that time it erected a two-kiln dry process plant. In 1908 the company shipped its first cement. The two kilns were 7 ft. 6 in. in diameter and 125 ft. long, coal being used for burning. In 1909 the company added a third kiln, 9 ft.x125 ft., and in 1910 a fourth kiln of similar size. In 1911 natural gas was discovered on its property and the kilns were changed, so as to use this fuel instead of coal. The plant with its four kilns had an ultimate capacity of 2,500 bbls. of cement per day. On January 1, 1917, the company was taken over by the Cement Securities Co., of Denver, Colo.

When the new owners took hold of this plant they soon realized that it would not do all that was desired. They wanted to get increased production so as to help meet the anticipated demand for cement during the reconstruction period after the war. Also the old plant was in rather bad shape and could not operate for any length of time without being repaired from time to time. Taking all these things into consideration, and realizing the great advantage of its natural gas resources for fuel, the Cement Securities Co. decided to build a new wet process plant, entirely independent of the old plant.

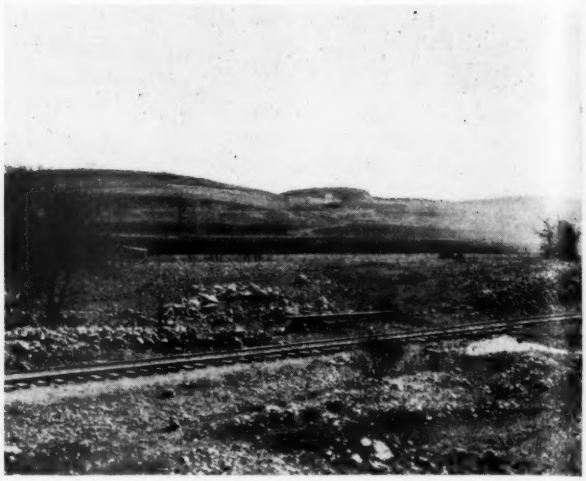
Wet Process vs. Dry

The company adopted the wet in preference to the dry process because of the

Panoramic view of quarry



Well drills for blast-holing



View of shale deposit

physical characteristics of the material and the climatic conditions. The 12 years of operation of the dry plant proved to the owners that in this case the wet process plant would be better than the dry process, even with waste heat utilization. They decided that a wet process plant would give them cement of a more uniform quality, would increase the grinding efficiency, create less dust and afford better facilities for control of mix.

Ground for the new plant was broken in May, 1918, and at the time of the writer's visit (March) two kilns were in operation and cement was being produced. The buildings of the new plant are of reinforced concrete throughout. The new plant is situated about one mile west of Ada, Okla., and to the north of the present old plant. Both plants are being served by three railroads—the St. Louis and San Francisco, Santa Fe and Missouri, Kansas and Texas.

Quarry

The limestone and shale entering into the manufacture of cement at this plant are located about six and one-half miles southwest of Ada, at Lawrence, Okla. The quarry was originally hand quarried, until 1914, when the steam shovel was introduced. The company operates here a commercial crushed limestone plant of the latest and most modern design, producing 3,000 tons per day.

M. O. Mathews, assistant manager, and O. A. Bayless, chief chemist

The company has a total area of 2,500 acres of stone land, practically an inexhaustible supply. The limestone quarry has a face some 4,000 ft. in length, with an average height of 40 ft. The shale quarry faces the limestone quarry, but is three-quarters of a mile apart from it. Neither of the two quarries require stripping of overburden.

Well drills are used for blast holing, cutting a 5⅝-in. hole. The company uses five drills, four of which are steam driven and one electric. Eventually, all of the drills will be electrically driven. The holes are drilled 14 ft. back from the face and 14 ft. apart, the average number of holes being 90. Two or three rows are shot at one time, the rows being staggered. The holes are charged with 50 per cent gelatine dynamite on the bottom and 40 per cent on top, the proportion being 1 to 4. All of the rows are shot at one time with a Cordeau-Bickford detonator.

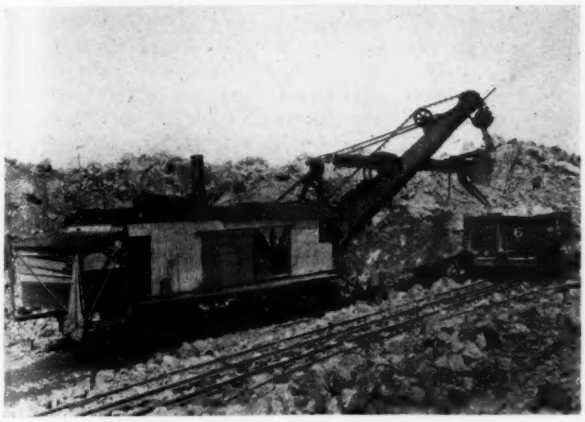
The larger blasted stone goes through a second blasting to make it suitable for handling by steam shovel. This is done by means of air drills or jackhammers and a light charge of ⅛ to ½-lb. of 40-per cent dynamite.

The rock is loaded into 12-ton electric driven side dump cars by means of a 60-ton Bucyrus steam shovel, with a 2½-cu. yd. dipper or with an 80-ton Marion shovel with a 3½-cu. yd. dipper.

Panoramic view of new and old plants—Office to right

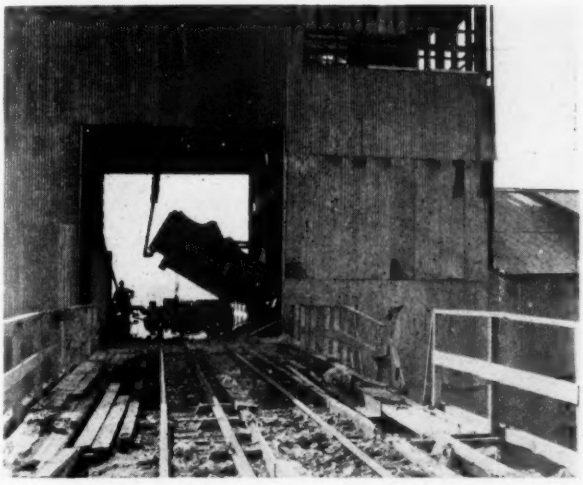
Electric Haulage System

The cars are standard gauge, operated by remote switch control and are conveyed to the crushing plant, where the car is automatically hoisted and the rock dumped into a 48-in.x72-in. Traylor jaw crusher, belt-driven from a 75-h. p. motor. The electric haulage system was installed by the Woodford Engineering Co., Chicago, Ill., and consists of ten 12-ton side-dump cars, each equipped with extra 35-h. p. railroad motors complete with electric switch control. The cars run around in a loop over the entire quarry floor, operated by one man stationed in a tower

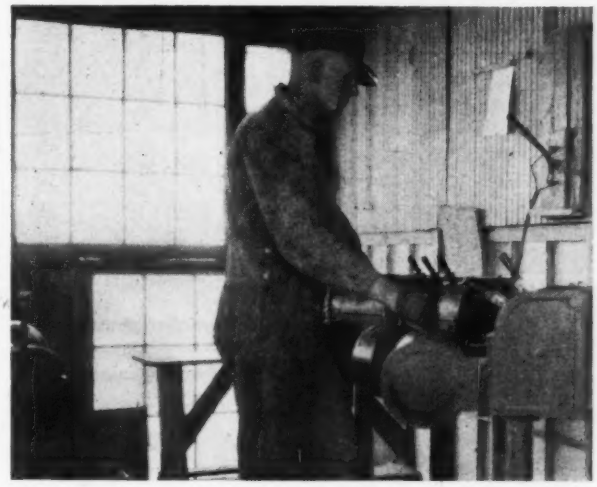


Steam shovel loading into quarry car

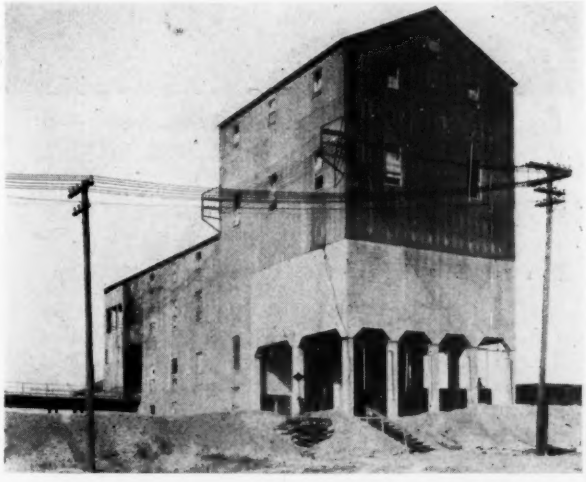
Steam shovel loading operation—Quarry car electrically controlled by shovel operator



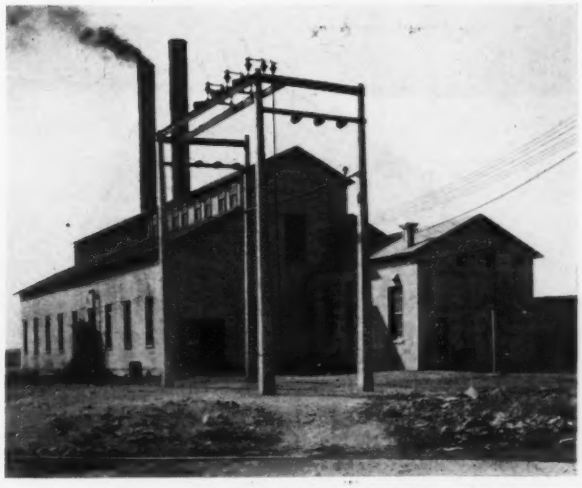
Quarry car side dumping into jaw crusher



Controller room for electric haulage system



Crushing plants—Note concrete loading bins



Emergency power house at quarry

located within the crushing plant. The operation is continuous and independent in action and the operator is in perfect control of all switch mechanisms. The electric haulage system was installed in 1918 and is operated by one man, and one electrician in charge of maintenance.

Crushing Plant

The crushing plant foundation is reinforced concrete and it is of modern design. The rock, after passing the jaw crusher aforementioned, falls on an apron feeder of 10-ft. centers, delivering the crushed rock to a bucket elevator (48-in.x16-in.x 23¾-in.) of 70-ft. centers, which in turn discharges into a hopper feeding the scalping screen, 8-ft.x24-ft., with 2½-in. perforations. Whatever passes through this screen is discharged into an inverted V. hopper, from which it can be fed to either a No. 9 Jumbo Williams mill or to two No. 6 gyratory crushers. The material from the hopper is fed to the Williams mill by means of an apron feeder. It is reclaimed from this mill by a bucket elevator of 80-ft. centers, which deposits the material into a hopper above the two sizing screens, 7-ft.x26-ft. with an inner jacket of ¾-in. perforations and an outer jacket of 1½-in. perforations. The stone from the two gyratory crushers is reclaimed by one elevator located between them, discharged onto a belt conveyor and then to a bucket elevator discharging into the sizing screens. The sizing screens separate the material into three grades; over 1½-in. is specified as ballast stone, ¾-in. to 1½-in. as concrete stone, and ¾-in. and under as screenings. The different sizes are by-passed into their respective bins.

The plant, as it stands, has an actual capacity of 3,000 cu. yds. of stone per day. The bins are of reinforced concrete and high enough to meet standard railroad specifications. Two lines of track, standard gauge, are carried under the bins, so that the various sizes of stone and screenings can be fed direct into the cars by gravity. The screenings here are used as the principal ingredient for the manufacture of cement.

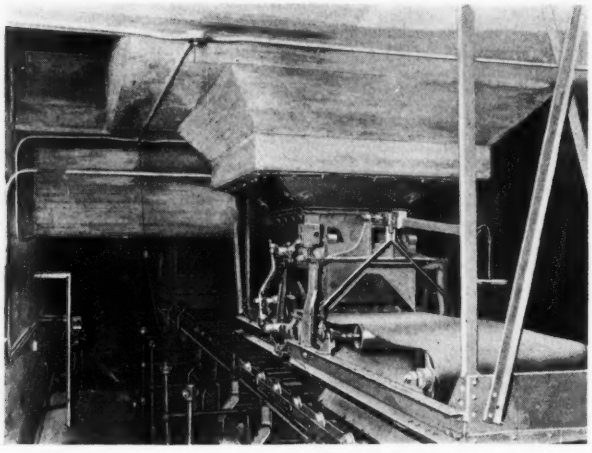
The crushing plant is electrically driven by current furnished by the Oklahoma & Shawnee Power Co., Byng, Okla., located 11 miles north of Ada. The crushing plant, however, is provided with a 750-k. w. steam power plant for emergency use, with coal as a fuel.

The stone from the quarry is shipped to the cement plant over the St. Louis and San Francisco Railroad, whose tracks extend past the crushing plant, with additional spur tracks to give storage to 40 cars of stone, 10 cars of coal, and sufficient storage for shale. The Frisco railroad besides shipping the product, furnishes the cars—gondola, side-dump type, and hauls the raw materials direct to the cement plant. It makes two trips daily.

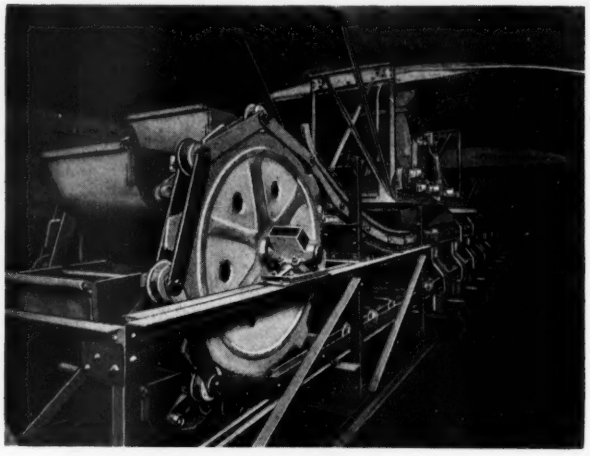
(To be continued)

Rear end of raw storage building

Trestle and raw storage building—Traveling crane



Poidometer measuring and feeding limestone and shale



Tail end of stone and shale bucket carrier

A Correction

THE TALC PRODUCTS CO., 120 Broadway, New York City, writes that an item published in ROCK PRODUCTS, May 21, 1921, page 46, regarding a new talc mine at Hemp, N. C., was in error. The item referred to stated that the Talc Products Co. was the owner of this new development. This company has nothing to do with the talc mine at Hemp.

Highway Research on a National Basis

Opportunity Afforded Material Producers to Further a Good Cause

THE ADVISORY BOARD ON HIGHWAY RESEARCH, of the National Research Council, announces that it has engaged as director, William Kendrick Hatt, Professor of Civil Engineering and Director of Materials Testing Laboratory, Purdue University, Lafayette, Ind. He is a member of the American Society of Civil Engineers, the American Society for Testing Materials, the American Railway Engineering Association and other technical societies. His work as an investigator in organizing the timber investigations of the U. S. Forest Service, and in other engineering and scientific fields for the past twenty years, is well known. Director Hatt began his duties July 1. His office is in the building of the National Research Council, 1701 Massachusetts Avenue, Washington, D. C.

This Advisory Board was established by the Division of Engineering, of National Research Council, with the co-operation of Engineering Foundation, as the result of a conference held in New York last November, attended by many representatives of national engineering societies, associations of vehicle and road material manufacturers, Federal Bureau of Public Roads, State Highway Departments and universities.

By the terms of the by-laws, the membership of the Advisory Board is composed of those organizations of national importance interested in design, construction, economics, maintenance and financing of highways, in materials and equipment therefor, and in vehicles used on highways, governmental departments and bureaus of similar interests, and higher educational institutions. The present organization members are:

American Association of State Highway Officials
American Concrete Institute
American Institute of Consulting Engineers
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Municipal Improvements
American Society for Testing Materials
Association of American State Geologists
Bureau of Public Roads, U. S. Department of Agriculture
Corps of Engineers, U. S. Army
Engineering Foundation
Federal Highway Council
National Automobile Chamber of Commerce
National Highway Traffic Association
Society of Automotive Engineers.

The officers of the board are: Anson Marston, chairman, director, American Society of Civil Engineers, member of Iowa State Highway Commission and Dean of Engineering, Iowa State College; Alfred D. Flinn, vice-chairman, secretary Engineering Foundation, and vice-chairman Division of Engineering, National Research Council. Other members of the executive committee are: Thomas H. MacDonald, chief Bureau of Public Roads, Department of Agriculture; George S. Webster, president American Society of Civil Engineers, consulting engineer, formerly director, Department of Wharves, Docks and Ferries, Philadelphia; Henry M. Crane, chairman Research Committee, Society of Automotive Engineers; W. K. Hatt, director.

In addition to the member organizations, 13 state highway departments and more than 40 universities have definitely signified their interest in the work of the Advisory Board and their willingness to co-operate.

The purposes of the board are:

a. To assist existing organizations in outlining a comprehensive national program of highway research and co-ordinating their activities thereunder.

b. To organize committees for specific problems.

c. To act in a general advisory capacity.

d. To serve as a clearing house for highway research information.

Three technical committees have been at work for a number of months. These are:

1. Committee on Economic Theory of Highway Improvement; chairman, Prof. T. R. Agg, Iowa State College.

2. Committee on Character and Use of Road Materials; chairman, H. S. Mattimore, Engineer of Tests, Pennsylvania State Highway Department.

3. Committee on Structural Design of Roads; chairman, A. T. Goldbeck, Engineer of Tests, Bureau of Public Roads, Department of Agriculture.

The Executive Committee of the Advisory Board has the creation of additional committees under advisement, such as Committees on Vehicle Design as Related to a Road, on Economics and Cost of Transport, on Financing Highway Improvements, or Traffic Studies, and on Organization of Construction Plants.

Much valuable experimental research work is being done by the Bureau of Public Roads, the U. S. Army, several state highway departments, the universities, and a few associations of manufacturers of vehicles and materials.

Two of the most important elements of the strength of the Advisory Board are the membership and the active participation of the Bureau of Public Roads and the Army Engineers. The bureau is represented by its chief, Thomas H. MacDonald, who is supporting the research work most loyally and intelligently. To represent the Engineer Corps of the Army the chief of engineers appointed Col. E. Eveleth Winslow, stationed at New York, and the appointment was officially confirmed by the Secretary of War. Major Mark L. Ireland, of the Quartermaster's Corps, is a member of the Committee on Economic Theory of Highway Improvement. During the summer, with the co-operation of the Massachusetts Institute of Technology, Major Ireland will conduct at Cambridge, Mass., an important series of tests on the traction resistance of vehicles and of road surfaces. Equipment and supplies have been provided and the necessary assistants assigned by the Army.

Director Hatt's work is expected to stimulate experimental work by such organizations to much greater activity, just as the work of the existing committees of the board has already had a stimulating effect. The director, in consultation with the Advisory Board, will prepare a comprehensive plan of the field of highway research, including economics, design, construction and administration, and will arrange a program of committee work for those fields that need to be occupied immediately.

The personnel of these committees will include active research workers within the state highway commissions, the universities, the governmental departments and other research organizations. A census will be taken of the research work completed and current, and the various research agencies will be invited to co-operate in an attack on those urgent problems upon the solution of which the future of highway transport depends.

The Advisory Board will not duplicate the efforts of existing research groups. Indeed, it will not do any research work directly, but will act rather to promote a co-ordinated effort in a consistent national program, suggesting problems to those organizations best fitted to attack them. It will also serve as a clearing house for information.

As one highway commissioner has expressed the present need, "I have $10,000,000 to spend on roads in my state this year. I know that I could save $500,000 by properly directed research studies. If your board will tell me what other states are finding out and what research work I should do to supplement their efforts, I will supply all the necessary men and funds." When it is considered that the funds available for the road construction program alone in the United States represent the expenditure of $1,000,000,000, the cost of the overhead organization, such as that of the National Research Council, to unify research, is insignificant. There is abundant money available for the research itself. The Advisory Board on Highway Research, of the National Research Council, is in a position to co-ordinate such expenditures in a comprehensive national program.

An informational service, giving the results of current studies and advances in the art, will be supplied to various co-operating bodies at frequent intervals.

The program for highway research will not be limited to problems concerned with the construction and maintenance of roads from the ordinary engineering standpoint. It will also consider those important problems of economics of transport upon highways in relation to other transport agencies, the relation of the design of vehicles to the character of road construction, and the important problems of administration involving traffic regulation, fees and maintenance.

This is the first effort seriously to attack the whole problem of highway transport. With the earnest desire of all interested to co-operate, the efforts of the National Research Council, seconded by Engineering Foundation and the national societies of engineers, should be effective.

ALFRED D. FLINN,
Vice-Chairman, Advisory Board on Highway Research.

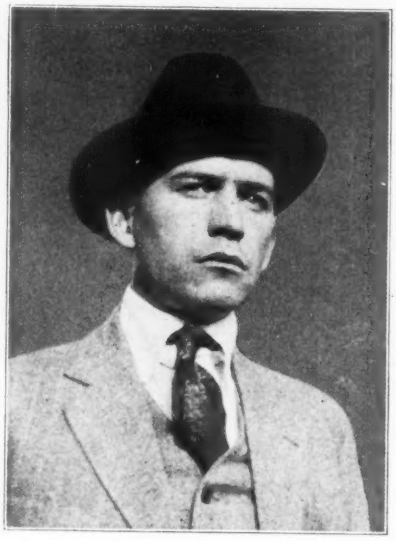
Persistence Will Win

SAND AND GRAVEL producers are again reminded to seek freight rate adjustments downward at competitive points at this time, while the railways are making public announcement that special efforts are being made to take care of such matters. Continue to point out to your immediate traffic officials every instance of local competition arising under high freight rates. Information is coming in from good sources that this kind of bombardment is having its effect. While there is little or no hope of satisfactory rate adjustment on sand and gravel for this season, no effort should be spared to keep the matter alive for the benefit of next season's business.—R. C. Yeoman, Extension Engineer, Indiana Sand and Gravel Producers Association, in Weekly News Letter.

Wisconsin Mineral Aggregate Association Has Highway Engineer

TO THE INDIANA Sand and Gravel Producers' Association belongs the credit of seeing the advantage of a trained civil engineer in the promotion of the mineral aggregate business; and to R. C. Yeoman, extension engineer of the Indiana Association, belongs the credit of having established the value of such an engineer's services to an association of this kind.

At least one more mineral aggregate association has followed suit. That is Wisconsin, where C. J. Kohler has been holding the office of extension engineer for several months. Mr. Kohler got his engineering education at Marquette University, and served with the county commissioner of highways of Milwaukee County for several



C. J. Kohler

years. He is an ex-service man, having been with the U. S. Artillery in France.

Since the war Mr. Kohler has been superintendent of construction for a highway contractor as well as a county highway engineer, so he is familiar with all phases of the highway game.

As extension engineer of the Wisconsin Mineral Aggregate Association his duties are various and numerous. He has visited practically all the plants represented in the association and helps any member who may ask it to improve his product or any feature of his operation. In other words he is a kind of consulting engineer on operating problems, whose services are available to any member.

As field man for the association on construction work he has earned his salary several times over in helping to establish co-operation and cordiality between contractors and material producers. He is the association's visible guarantee of *service*. He sees to it that the contractor gets deliveries when he needs them and where he needs them.

As a sort of arbiter on the quality of material he does a service that no individual producer's employee could give. In short he is the go-between of the mineral aggregate producer and the mineral aggregate consumer, whose interests are the interests of the whole industry and are not circumscribed by a single job or a particular variety of material.

Mr. Kohler has so performed these duties that he has demonstrated that an association which makes *service* its keynote can give service of an invaluable kind through the assistance of one trained engineer who knows the material as well as the construction game.

The Why of Clean Sand and Gravel

BULLETIN No. 7 from the Structural Materials Research Materials Laboratory, Lewis Institute, Chicago, has just been received. It covers the effect of tannic acid on the strength of concrete. Tannic acid is the injurious ingredient of organic matter which usually comes from surface loam and is generally present in unclean sand and gravel. The strength of concrete was reduced for all percentages of tannic acid, for all mixes and all ages covered by the tests. "Less than one-tenth per cent of tannic acid in terms of the weight of the aggregate may reduce the strength of the concrete to one-half its normal value." The per cent of tannic acid is determined by colorometric tests, a description of which is attached.

The report of the above tests is very valuable to sand and gravel producers. It is one of the strongest arguments against the use of pit-run materials for concrete. It is common knowledge among gravel men that pit-run material can not be supplied uniformly clean in commercial quantities. It may be true that a few wagon loads can be selected from a pocket but to depend upon such material is unwise.—*Indiana Sand and Gravel Producers' Association's "News Letter."*

Educational "Movie" Films

TWO EDUCATIONAL MOTION PICTURES illustrative of the mineral industry have recently been completed, the United States Bureau of Mines announces. The first of these, the Story of Abrasives, shows the generation of power at Niagara Falls, its utilization for the production of carborundum.

The Story of Rock Drilling shows the use of modern types of rock drill, not only for shaft-sinking and underground operations, but also for quarrying.

Requests for the loan of these films for showing at public gatherings where no admission fee is charged should be addressed to the Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pa.

Editorial Comment

Possibility of Car Shortage

Construction work of all kinds is rather slowly but nevertheless surely picking up, and the prediction is being quite freely made that fall will see more than normal activity in road-building and in house-building. Are building material producers going to be again obliged to fight for their lives against car shortage and embargoes on their material?

After all the popular agitation of the building situation and its vital importance, it is hard to believe that the Interstate Commerce Commission would order an embargo against construction materials, yet the chairman is reported to be ready to do so if the predicted coal shortage materializes.

The demand for coal has been way below normal for months, chiefly however because great basic industries like steel have only been operating to about 20 per cent of their 1918 capacities. The problem is to know what part of the loss of production in coal is due to the business slump and what part is due to the failure of the industries to accumulate normal stocks. But since no industry can tell just what demands will be made on it in the next few months, practically none of them can estimate what is a *normal* stock of coal to meet those demands.

Then again it is hard to differentiate between propaganda of the coal operators to bolster up the market and real-honest-to-God warnings of an impending coal shortage. The most significant feature of the whole situation is that Secretary Hoover has joined forces with those who see the possibility of a coal famine and an open-top car shortage.

Road Material Vs. Ballast

That railways sometimes oppose road-building because it means a rival transportation line maintained at public expense, was intimated in the July 16 issue of ROCK PRODUCTS. Another and rather novel railway man's objection to activity in road-building comes from the chief engineer of one of the largest transcontinental railways in the Southwest, who writes the editor as follows:

> These lines need a great deal of ballast but we are generally following the practice of producing it with our own equipment and force rather than by contract or purchase. There has been such a heavy demand for gravel and rock in connection with highway improvement and bridges along our lines that it has been impossible for us to purchase railroad ballast at present prices. We have therefore been operating several gravel pits and quarries of our own, and wherever we have gotten the work well organized, we will probably continue in the same way and therefore will be in the market for very little, if any, ballast.

This is not given as a valid argument against highway improvement, nor even as a reasonable one against the purchase of ballast. It merely illustrates a trend of railway thought that is unfortunate for the producers of mineral aggregates. It shows that the producers are losing in some instances, at least, the very intimate and friendly relationship they once had with railroad managements.

After they got together and discussed costs and exchanged experiences many producers came to think that the railways had been getting ballast for too long a time at cost or less than cost of production. They divided into two groups of producers with opposite ideas on the question of ballast. One group believes that a profit over and above cost should be shown on every ton of stone produced, whether used for railway ballast or something else. They see no reason why other sizes should sell at a higher price in order that ballast may be sold at a less price than the pro rata cost of production. The other group of producers sees ballast as a by-product in the production of commercial sizes. They consider a large ballast order, sold even at less than pro rata cost of production, a sheet anchor to the windward against the fluctuating demands of commercial business, allowing them to keep their organization intact and their production up to maximum, thus materially reducing the cost of producing commercial sizes.

Aside from these direct benefits there is the additional assurance of a car supply and of a good lever to use for freight-rate bargaining in particular instances on the commercial business.

The next few years bid fair to be mighty good ballast years; and as in many instances in the past freight rates have been tied up more or less remotely with the ballast business they are likely to be so in the future.

Co-operation and Tolerance

In these days of crimination and recrimination among building material producers, dealers, contractors and building trades unions, the following from the weekly bulletin of the Illinois Concrete Aggregate Association is peculiarly appropriate to all interests.

> Benjamin Franklin said, "When you assemble a number of men to have the advantage of their joint wisdom, you inevitably assemble with those men all their prejudices, their passions, their errors of opinion, their local interests and their selfish views."
>
> It is not reasonable to expect that these elements of discord can be harmonized in a short time without many arguments. But the result is worth all the trouble and work of bringing it about for when harmony and right views are established, they are usually established forever.
>
> Any Association member who neglects the meetings of the Association, especially when co-operation is bad, is wasting his money and not only injuring himself but injuring all the other members.
>
> Association members very seldom are malicious. They are distrustful of your purposes the same as you are distrustful of theirs. Both you and they must work out plans that will be for mutual interest. This can never be done unless you attend the meetings, are frank in expressing your views and are willing to make concessions here and there so that the other fellow will be justified in making concessions to you.

Review of Eastern Markets

THERE IS A GRADUAL TREND towards larger construction operations in the New England districts, and the textile industry is coming forward as the leading factor in this direction. The past fortnight shows a number of sizable contract awards for new mills in Massachusetts and Rhode Island, calling for cement, sand and other kindred building products. Housing work, also, is growing stronger in general tone, with more important developments anticipated at an early date.

The building material market is rather spotted, with prices holding firm at prevailing levels. At the same time the general sentiment is for lower quotations, despite the fact that recent reductions have put certain materials on a basis that warrants building at the present time.

Portland cement in cloth is being sold in the Boston market at $3.90, with bag rebate of 10 cents. In paper, the material is priced at $3.75 a barrel, delivered. Hydrate finishing lime is being quoted at $22 a ton in paper, and at $20 a ton for common hydrate. Common lime is selling for $3.20 a small barrel, 180 lbs., and at $4.50 for barrel of 280 lbs., net weight. Finishing lime is priced at $3.40 and $4.75 for the small and large, respectively, as noted, delivered on the job.

Crushed stone is moving under rather a slow market, with quotations holding at $3 a ton in truckload lots. Mortar sand remains at $2.50 a yard, while beach sand is priced at $4 a ton. The local stone market is without feature, limestone, sandstone and bluestone being around a $2 per cu. ft. level, and with no immediate change in sight.

At Providence, R. I., all building materials continue at higher levels. Cement in cloth is priced at $4, with a 30-cent rebate for the four bags. Barreled lime is at $3.25 for the 180-lb. container, and at $4.80 for the 280-lb. barrel. Common hydrate lime shows no change from the figure quoted in the last issue of Rock Products, being retailed at 70 cents for 50-lb. bags; finishing hydrate is selling for 75 cents for 50-lb. bags.

New York

Construction operations at New York are centered in housing work, and in the different boroughs there is a considerable amount of dwelling and apartment work now under way. The latter operations are, in the main, of speculative character, and promoters are not losing any opportunity to bid for the best possible prices from contractors, as well as for materials for construction.

The local supply market continues with rather an uninteresting uniformity. Prices show no variation during the past fortnight, except in the matter of stone, and this change, noted below, is due to freight reduction. The call for materials shows gradual betterment, and inquiries are becoming more numerous.

The labor situation at New York is not encouraging at the moment, and the deadlock between employers and workmen in the matter of wage concessions, intimated in the last issue of Rock Products, has come to pass. The men are holding out for a continuance of present wage scales until the termination of an existing contract, next December, while the employers, seeking a $1 a day reduction now, hold that a decline of from $2 to $3 a day will be necessary if the men defer the concession until the date noted.

Portland cement holds at $3 a barrel, delivered, with an aggregate rebate of 40 cents for bags. The call is fair at the moment. Hydrate finishing lime in cloth is priced at the local dealers at $26 a ton, delivered, and hydrate common lime, in cloth containers, is quoted at $22.50 a ton. There is a present bag rebate of 20 cents each on this material. Common lime in the standard 300-lb. barrel is selling for $4.50, and finishing lime, same size container, is priced at $4.70, delivered.

The wholesale market at New York shows no change worthy of mention, and prices given in these columns in the last issue of Rock Products maintain. Dealers are showing a greater inclination to stock up, and a few sizable warehouse orders have been recorded during the past fortnight. A fair amount of material is coming into the local market, and more than sufficient for any immediate demands.

Philadelphia

With construction work at Philadelphia, Pa., moving along at a pretty low ebb, a change is taking place in market prices, and lower levels are being recorded. Portland cement is selling at around $3.50 a barrel, delivered, less bag rebate. Building sand, selling at $2.50 a yard, seems due for an early decline, with crushed stone, now at $4.50 a ton, following. Slag is another item in this same indicated decline, with the total reductions to approximate about 50 cents a yard.

Conditions in the Lehigh Valley District

The situation is changing for the better in the Lehigh Valley cement district of Pennsylvania, and the last week shows a greater number of mills on the producing list, with increased production at plants that have been engaging under curtailed outputs. The impetus given to manufacture is found in the increasing demand, and a number of the mills are now shipping close to their normal totals. The material is being used for road building, now coming along at a good pace, and for building supply dealers' requirements. Large construction work requiring cement are still in the minority in the eastern sections.

The Atlas Portland Cement Co. is continuing under good output at its Northampton mill, and in anticipation of maintaining production for an indefinite period, as well as to prevent any possible fuel shortage, the company is storing an unusually large amount of bituminous coal. All the regular storage bins are being utilized, and abandoned quarries are now being stocked with the fuel, with installed facilities to make good storage quarters.

As forecasted in the last issue of Rock Products, the Giant Portland Cement Co., has resumed production at its Central Mill, in the Coplay district, placing two out of five kilns in service, and with indications for placing other of the kilns in operation at an early date. This mill has been shut down for about a year past.

The Coplay Cement Co., Coplay, has placed its local Mill C on a regular production basis at normal capacity. For some time past the plant has been running at 50 per cent of normal. The company is giving particular attention to welfare work at the plant. A large swimming pool, about 100 ft. wide and 300 ft. long is being constructed in triangular shape, to be used by employes. An athletic field is being laid out near the office building, with baseball diamond and adjoining land for other sports.

The Pittsburgh, Harmony, Butler & New Castle Railway Co. has filed new freight schedules with the State Public Service Commission, covering a decreased tariff on carloads of burned and raw pulverized lime in sacks, burned and lump lime, and crushed limestone in bulk. The new rates will apply between all points on the line.

John Williams and Thomas Jones have leased the abandoned quarry of the Cambridge Slate Co., Slatington, Pa., and will install machinery at once for the operation of the property. There is a good vein of slate available and an extensive output is planned.

Accident Prevention

Oiling Devices and Oilers

(Prepared by the Engineering Department of the National Safety Council for Rock Products)

OIL CUPS are often found in older installations. These may be filled with long-spout oil cans from floor level. Cups are superior to old-style direct oiling, and, like similar devices described herein, soon return cost of installation in saving of oil.

Old plain bearings may often be replaced at nominal cost, using the new self-oiling bearings in the old hanger frames. In the case of oiling devices in which the oil supply is held above the shaft the oil is used but once and is then lost, while with self-oiling bearings which store the oil below the shaft, the oil is fed up the shaft repeatedly until it evaporates.

Oiling Loose Pulleys

Loose pulleys when practicable should have oiling devices so arranged as to permit oiling in any position of loose pulley when machinery is shut down. Self-oiling loose pulleys are, possibly, a bigger safety factor than bearings because of the proximity of belts.

Drip Trays

In many older installations drip trays are necessary. Trays should be securely attached to hanger and occasionally inspected as several accidents are recorded through falling of heavy trays.

Lubricant will remain interposed between shaft and bearing and will serve its purpose to best advantage in bearings of the ordinary type when the bearing pressure does not exceed that obtained from the following relationship: p. v. = 800, where p. is the pressure in pounds per square inch of projected area (the length of the journal times the diameter), v. is the surface speed of the journal in feet per second, and 800 is a constant derived by Thurston and based on good average practice for bearings of ordinary type. An example of the application for this relationship is: At 120 r.p.m., shaft diameter 2½ in., v works out as 1.3 ft. per second. Therefore p will be 800—1.3 or about 615 lbs. per sq. in. If the journal was 5 in. long the total load on it could be 2.5x5x615 or 7,700 lbs.

In using self-oiling bearings the oil will remain in the bearing until it evaporates, except as it may travel out along the shaft, due to capillary attraction existing in the particles of dust which lodge on the shaft. It is desirable to eliminate this waste of oil with the attendant possibility of oil dripping on clothing or material under the shaft.

A ring of cardboard, fiber or similar material somewhat larger in inside diameter than thickness of shaft, will, if slipped over the shaft, travel from pulley to pulley or from hanger to hanger and keep the shaft clean, thus obviating necessity for manual cleaning.

Oilers or others should never approach shafting if wearing loose sleeves, flowing neck ties, loose jumpers, etc.

Overalls are now made in the form of union suits, either with or without drop.

seats. These eliminate many of the loose flying parts of garments and are particularly adapted to the needs of oilers.

Shafting and appurtenances in certain locations, where the generation of static electricity creates a hazard, should be carefully "grounded" to prevent possibility of accident through this cause.

Oiling Machinery

Where practicable machinery should not be oiled or lubricated while in motion. Gravity-oiling systems, automatic lubricators, capillary feeds, oil cups, etc., make hazard from this source, in most instances, unnecessary. In old installations or where manual oiling is necessary in the newer apparatus, oil cans with long spouts can often be used to good advantage.

Guards installed less than fifteen inches from the machines are usually provided with slide or door for use of oiler and repair man. In some installations it is advisable that those apertures be locked and keys supplied to oilers and repairmen.

FORM USED FOR THE INSTRUCTION OF OILERS

OILER'S NAME..... Date.....

INSTRUCTIONS TO OILERS

After being appointed oiler, the foreman of the oilers or his assistant will see that the oiler named above is properly instructed in all things that pertain to the work of an oiler, explaining each of the following rules and giving to him such other knowledge as the foreman deems necessary.

(a) Explain to inexperienced men the need of applying oil to parts of machinery working with friction; for example, a shaft supported by a hanger turns in the bearing part of support. The friction caused by shaft revolving in the bearing box heats the metal of both parts and if continued would eventually stop the turning shaft. Hence it is necessary in order to keep the machinery in motion and cause moving parts to slip easily, to apply some form of lubrication.

(b) It is important that an oiler keep the spout of his oil can clear of particles, as dirt might prevent the flow of oil and the result would be dry bearings, although the oiler had supposedly done his duty.

(c) Care should be exercised when oiling not to cause overflow, thus filling drip cup and spilling oil on whatever is underneath bearing.

(d) Keep oil holes in bearings clean and free from dirt, as this allows oil to get to shafting and makes shafting slip easily.

(e) The clothing worn by an oiler should be close fitting. There should be no ragged or flying ends, torn, unbuttoned or loose sleeves.

(f) The correct use of steps and portable ladders in his work should be explained to the above employe. He should be taught where and how to place a ladder and the correct way of oiling from it.

(g) Do not oil bearings of several countershafts from one position of ladder—change position of ladder and oil those bearings within reach.

(h) Step ladders should not be placed so as to straddle machines in motion.

(i) Care should be taken not to walk or stand on machines.

(j) Idle belts which are hanging about revolving shaftings should not be used as a support in reaching bearings.

(k) When ladder is too short and necessitates straining in order to reach oil cups, report same to foreman of oilers and a higher one will be provided.

(1) Reaching over pulleys or between belts is dangerous.

(m) Belts should not be thrown off with the hands; a belt shifter is provided for that purpose.

(n) All broken ladders and dangerous conditions that may be remedied should be reported to the foreman of the oilers.

Signed .....
Oiler

Signed .....
Foreman

Note: Make out in triplicate; one for the Employment Bureau, one for file in office, and one for oiler.

New Machinery and Equipment

Ten-Ton Locomotive Cranes Save Money Handling Sand and Gravel*

"ANY MAN who attempts to handle large quantities of sand and gravel without the assistance of locomotive cranes or similar machinery is a good many years behind the times," says William J. Mahoney, president of the Lenox Sand & Gravel Co., 157th Street and Hudson River, New York City.

"We are wholesale and retail dealers in sand, gravel, grit and broken stone, and are one of the largest concerns of the kind in Greater New York. About 75 per cent of what we handle is sand. All our material comes to us in scows and barges and is unloaded at our two docks, of which one is located at 79th Street and North River, and the other at 151st Street and Harlem River. From our docks the material is loaded as needed into our motor trucks for delivery in any part of Greater New York.

"Up to seven years ago we did all our unloading with hand labor, using wheelbarrows for getting the material out of the boat and shovels for loading it into the wagons which were in use at that time. Twenty-five men were constantly employed at each dock in unloading the boats and loading the wagons.

"To save labor, decrease the congestion at the docks and increase the speed of our deliveries we installed a 10-ton Brownhoist locomotive crane in 1914.

"We were so pleased with the results of our first crane that a year later we purchased another Brownhoist of the same capacity, and installed it at our other dock. Both cranes are equipped with 1¼-cu. yd. buckets.

Operating Costs

"We have a total annual operating cost of $6,738.50 for each crane. We pay the operator $11 a day. This is rather high, but we have found it profitable to pay a little bit above the union rate in order to get a good man and keep him. We allow $600 a year per crane for repairs, because we figure they will average about that for the 20 years' life we give them. Since each crane handles 150,000 tons a year the cost per ton is only 4.49 cents, which is remarkably low.

"The operating cost of our fleet of 5-ton motor trucks is $35 a day. Since they average 6½ tons to the load, they take 23,077 loads from each yard per year. If we loaded the trucks by hand we would get five trips a day per truck, which would require 4615.4 truck days per year per yard. At $35 a day the annual trucking cost would be $161,539 for each yard. Loading the trucks by crane, however, enables us to get 12 trips a day and requires only 1,923.1 truck days a year for each yard at a cost of only $67,308.50.

"The annual saving in motor truck efficiency due to the rapid loading of the cranes is therefore $94,230.50 a year for each yard. Adding this to the $45,000 saving in labor, we have a total gross saving of $139,230.50 on each crane a year. Deducting the operating cost we have a net saving of $132,492 a year on each crane, or $264,984 a year on the two Brownhoist cranes.

Other Advantages of Cranes

"The crane method has many advantages in addition to the actual saving of money. One of the greatest is the increased service to our customers, most of whom are contractors. It is a big thing to them to be able to call up and get a load of sand in an hour instead of waiting the hour and a half that would be necessary if we loaded by hand. A truck can be loaded in less than a minute from the hoppers, whereas it would take 30 minutes by hand.

The locomotive cranes have also lessened a good deal of the congestion on the docks. If we used stiff-leg derricks it would be necessary to tie the boats up at a certain point because the derricks could not be moved. With a locomotive crane, however, the boats tie up at the most convenient point, and the crane runs to them for its load. This enables us to spread our boats out so as to eliminate congestion and the unnecessary shifting of the boats.

"To illustrate further the flexibility of the crane, suppose that hopper No. 1 is full of sand, No. 2 is full of gravel, and a customer telephones in for a load of broken stone. The crane can run along to where the stone is stored and load the truck directly in a few minutes. If we used derricks exclusively this job would have to be done by hand, with the consequent labor expense and the delay to the customer."

The table on the opposite page gives an itemized statement of the cost of operation and the saving effected by the use of the two locomotive cranes, based on figures furnished by the Lenox Sand and Gravel Co. to the manufacturer of the cranes.

Locomotive crane handling sand and gravel on waterfront

*Data furnished by H. P. Gould Co., Chicago, Illinois.

Cost of Operation—10-Ton Brownhoist Locomotive Crane

Depreciation: $\frac{\$7,000.00}{20 \text{ yrs.}}$	$350.00
Average yearly int. at $6\% = \frac{21}{20} \times \frac{\$7,000 \times .06}{2}$	220.50
Repairs and maintenance	600.00
Coal—150 tons × $14.00	2,100.00
Labor—1 man at $11.00 per day × 300 days	3,300.00
Taxes and insurance	168.00
Total annual operating cost	$6,738.50
Tons handled: 150,000. Cost per ton: $\frac{\$6,738.50}{150,000}$	.0449

Saving in Trucking Cost Due to Crane

Truck loads per year: $\frac{150,000 \text{ tons}}{6.5 \text{ tons per load}}$	23,077.
Truck-days required, hand loading: $\frac{23,077}{5 \text{ trips}}$	4,615.4
Annual trucking cost, hand loading: 4,615.4 × $35.00	$161,539.00
Truck-days required, crane loading: $\frac{23,077}{12 \text{ trips}}$	1,923.1
Annual trucking cost, crane loading: 1,923.1 × $35.00	$67,308.50
Annual saving due to crane loading	94,230.50

Total Savings Due to Locomotive Cranes

Labor displaced, 25 men @ $6.00 per day, 300 days	$45,000.00
Saving in trucking cost	94,230.50
Gross annual saving per crane	$139,230.50
Deduct annual operating cost of one crane	6,738.50
Net annual saving per crane	$132,492.00
Net annual saving on 2 cranes	$264,984.00

Price Catalog on Material Handling Machinery Issued

THE Jeffrey Manufacturing Co., Columbus, Ohio, has just issued catalog No. 350 on material handling machinery, which is now ready for distribution to the trade.

This catalog contains illustrations, price lists and dimensions and specifications of Jeffrey products such as chains, sprockets, conveyor and elevator details, transmission and gears, conveying and elevating machinery, coal handling equipment, mining machinery, crushers, pulverizers, portable loaders, etc.

The book should prove to be of special interest to rock product producers, since it is one of the first price catalogs to be issued in some time and indicates that conditions are slowly but surely returning to normal.

New "Draper" Steel Barrel Catalogue

THE Draper Manufacturing Co., East 91st Street and Crane Avenue, Cleveland, Ohio, has recently issued a new catalog illustrating and describing the steel barrels or shipping containers manufactured by them. This catalog should be especially interesting to lime manufacturers, since the steel barrel is being used more and more for the shipment of chemical lime in a pulverized form.

The catalog is a very attractive one, bound with a leather cover, and contains a wealth of information. It should be on every producers' desk where he can have ready reference to it.

Some of the useful information contained in the catalog is as follows: Definition of electrical units; the metric system of weights and measures; method of finding weights of various materials; painting problems; table of miscellaneous weights; weights of oil and other liquids; testing petroleum products; table of legal weights and air heating table.

New Low Freezing Dynamite

THE DU PONT COMPANY has developed and perfected a formula for the manufacture of straight dynamite which results in that explosive being proof against freezing even in zero tempeartures. As a consequence of this development, the company has determined to discontinue the manufacture of its former straight dynamite and hereafter all this kind of explosive will be made by the new low-freezing method. The perfection of the formula is the result of years of experimentation in the laboratory and in the field and marks one of the greatest advances in the art of explosive manufacture. Straight dynamite has for years been the standard of the world in nearly every kind of open work, but a disadvantage has been its liability to freeze at temperatures below 50°F. As any dynamite loses some part, if not all, of its efficiency when chilled or frozen, many attempts have been made to make it low-freezing. The perfection of the new "powder" by the Du Pont Company makes it possible to use straight dynamite the year round in industrial operations. Thawing, with its loss of time and attendant dangers, has practically been eliminated. The new explosive has been fully tested and proved and the formula for making it has been made standard in all the plants of the company producing dynamite.

National Lime Association Asks Protection for the Dye Industry

AT THE CONVENTION of the National Lime Association in New York on June 15, 16 and 17, the following resolution in regard to needed dye legislation was adopted and has subsequently been brought to the attention of the Congressional tariff committees:

WHEREAS, A complete, self-sustained coal-tar chemical industry is essential to the industrial development of our country, to its national safety and security, and is important in its very close relation to medical science, and

WHEREAS, It has been shown that unusual protection must be given by the government to this industry, the development of which began only when the war gave it its opportunity, and that a tariff alone will not protect it adequately against the determined assaults of the German-government - fostered - chemical - cartel which is seeking to regain this, the world's richest market, now the only market without permanent protection; therefore, be it

RESOLVED: That the NATIONAL LIME ASSOCIATION hereby urges upon Congress in solemn earnestness the prompt enactment of adequate legislation to protect and maintain in this country this vital chemical industry.

Changes at Semet-Solvay Plant

IN LINE with the general policy of reorganization adopted by the Solvay companies following affiliation with the Allied Chemical and Dye Corporation some time ago, a number of changes in the executive personnel have been made recently, affecting all plants of the company.

W. L. Keen, chief engineer of the Semet-Solvay Co., has resigned and will be succeeded by A. T. Leavitt, who has been assistant manager of engineering. G. Craig Leidy is made manager of the coke sales department to succeed W. H. Ball, who recently resigned to enter the coal business in Detroit. William Hutton Blauvelt, manager of the plant development department, has been made consulting engineer.

During the past few weeks several hundred men have been laid off at the plants of the company in accordance with organization of the plants for increased efficiency and because of post-war conditions

The amalgamation of the companies will have no effect on the usual semi-annual bonus to employes of Semet-Solvay and the Solvay Process Companies, who, including those recently laid off, are receiving from 3 to 12 per cent of their salaries for the first six months of the year.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.35	1.35	1.25	1.25	.....
Buffalo, N. Y.			1.30 per net ton, all sizes			
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.75	1.75	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton, all sizes			
Eastern New York	.90	1.80	1.70	1.60	1.60	1.50
Eastern Penna.	1.00	.....	1 85	1.85	1.85	1.85
Munns, N. Y.	1.00	1.50	1.50	1.25	1.25	1.25
Walford, Pa.	1.40	1.60	1.75	1.75	1.60	1.60
Western New York	.70	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45	.....	.....
Alton, Ill.	2.00	.....	1.50	1.40	1.35	.....
Bettendorf, Ia.			All sizes, 2.00 cu. yd. f.o.b. quarry			
Brillion, Wis.	1.00	.....	1.20	1.00	1.00	.....
Buffalo, Iowa.	1.00	1.30	1.40	1.20	1.30	1.30
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Columbia, Ill.	2.15	1.90	2.00	2.00	1.90	1.90
Dundas, Ont.	1.00	1.50	1.50	1.50	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	.....
Greencastle, Ind.	1.50	1.25	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10
Illinois, Southern	1.75	1.60	1.60	1.50	1.60	.....
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
Lannon, Wis.	.90	1.00	1.00	1.00	1.00	1.00
Marblehead and Brillion, Wis.	1.10	.....	1.20	1.10	1.10	.....
Montrose, Ia.	1.35	1.75	1.75@1.85	1.75	1.65@1.75	.....
Oshkosh, Wis.			1.40 per ton, all sizes			
River Roage, Mich.	1.25	1.40	1.40	1.40	1.40	1.40
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern, Illinois	1.75	1.60	1.50	1.50	1.50	.....
Stolle, Ill. (I. C. R. R.)	1.75	1.60	1.60	1.50	1.50	1.50
Stone City, Iowa	.80	.....	1.40	1.35	1.30	.....
Toronto, Canada	1.90	2.40	2.40	2.40	2.15	2.10
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
SOUTHERN:			These prices include 90c freight			
Cartersville, Ga.	.....	1.85	1.60	1.60	1.60	.....
Chickamauga, Tenn.	1.00	1.00	1.25	1.00	1.00	1.00
Chico, Texas	1.10	.....	1.25@1.50	.....	1.25	.....
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Fort Springs, W. Va.	1.55	1.70	1.75	1.75	1.50	.....
Garnet and Tulsa, Okla.	.....	.....	1.60	1.60	1.45	.....
Ladds, Ga.	1.50	.....	.....	1.25	1.25	1.25
Portland, Ga.	.75	2.00	1.50	1.50	1.50	1.50
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	2.10
			Other sizes 1.80 per ton			
Blue Springs and Wymore, Neb.	.20	1.65	1.60	1.50	1.40	1.30
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	2.00	2.00	2.00	2.00	2.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	1.25	2.50	2.35	2.25	2.00@2.25	2.00
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.80	1.95	1.80	1.60	1.40	.....
Bound Brook, N. J.	2.00	2.30	2.00	1.70	1.60	.....
Dresser Jct., Wis.	1.00	2.45	2.45	2.30	2.00	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.40	1.40
Dwight Station, Calif.			.75@1.00—all sizes			
E. Summit, N. J.	2.10	2.35	2.15	1.75	1.75	.....
Eastern Mass.	.60	1.95	1.75	1.50	1.50	1.50
Eastern New York	.90	1.80	1.70	1.60	1.60	1.50
Eastern Penna.	1.60	2.25	1.95	1.80	1.80	1.70
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	.....
Oakland, Calif.	1.75	1.75	1.50	1.50	1.50	1.50
Richmond, Calif.	.50*	.....	1.75*	1.50*	1.50*	.....
San Diego, Calif.	.50@.70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	2.00	2.40	2.10	1.80	1.75	1.75
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60	.....	1.30	1.50	1.20	.....
Berlin, Wis.	1.60	.....	1.40	1.50	1.30	.....
Columbia, S. C.—Granite	.75	.....	2.75	2.50	2.35	.....
Dell Rapids, S. D.	1.00	.....	2.10	2.10	2.10	.....
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Eastern Penna.—Sandstone	1.10	2.00	2.00	1.70	1.70	1.70
Eastern Penna.—Quartzite	.90	1.70	1.55	1.30	1.30	1.10
Holton, Ga.—Granite	.40	.....	2.50	2.25	2.25	2.00
Lohrville, Wis.	1.60	.....	1.30	1.50	1.20	.....
Los Angeles, Cal.—Granite	.....	1.25@1.50	1.15@1.40	1.15@1.40	.....	.....
Macon, Ga.—Granite	.50	.....	2.50	2.25	2.00	2.00
Middlebrook, Mo.—Granite	3.50@4.00	.....	.....	2.00@2.25	.....	1.25@1.75
Red Granite, Wis.	1.60	.....	1.30	1.50	1.20	.....
Sioux Falls, S. D.	1.00	.....	2.00	2.10	2.00	.....
Stockbridge, Ga.—Granite	.50	2 00	1.90	1.75	1.75	.....
Utley, Wis.	1.60	.....	1.30	1.50	1.20	.....

*Cubic yard. †Agrl. lime. ||R. R ballast. §Flux ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.50; bulk 2.75

Coldwater, N. Y.—Analysis, 56.77% $CaCO_3$, 41.74% $MgCO_3$, 70% thru 200 mesh, 95% thru 50 mesh, sacks 4.00; bulk 3.00

Grove City, Pa. — Analysis, 94.75% $CaCO_3$, 1.20% $MgCO_3$ — 70% thru 100 mesh; 80 lb. ppr., 5.50; bulk 4.50

Hillsville, Pa.—70% thru 100 mesh; sacks, 4.75; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.50; bulk 2.75

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

Walford, Pa. — 50% thru 100 mesh, 60% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$ — 90% thru 100 mesh; paper bags, 6.25—90% thru 50 mesh; paper bags, 5.25; bulk 3.25

Williamsport, Pa. — Analysis, 88-90% $CaCO_3$, 3-4% $MgCO_3$—50% thru 50 mesh; paper, 5.50; bulk 4.00

CENTRAL:

Alden, Ia.—Analysis, 99.16% $CaCO_3$ ..... .80

Alton, Ill. — Analysis, 96% $CaCO_3$, 0.3% $MgCO_3$—50% thru 4 mes 4.50

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh ..... 1.60@2.00

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Buffalo, Ia.—90% thru 4 mesh 1.00

Cape Girardeau, Mo.—Analysis, 90% $CaCO_3$, .044% $MgCO_3$—50% thru 4 mesh 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh 1.50

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh ..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh 2.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh 2.00

Marblehead, O.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$—52.4% thru 100 mesh, 59% thru 50 mesh, 100% thru 10 mesh; sacks, 5.25; bulk 3.00

Limestone screenings; bulk 1.50

McCook, Ill.—Analysis, 54.10% $CaCO_3$, 45.04% $MgCO_3$—100% thru ¼-in. sieve, 78.12% thru No. 10, 53.29% thru No. 20, 38.14% thru No. 30, 34.86% thru No. 50, 22% thru 100 ..... 1.50

Milltown, Ind. — Analysis, 93.10% $CaCO_3$, 3.2% $MgCO_3$ — 24% thru 200 mesh, 33.2% thru 100 mesh, 40% thru 50 mesh, 50% thru 40 mesh, 70% thru 20 mesh 1.65

Mitchell, Ind.—50% thru 100 mesh 2.00

Montrose, Ia.—½-in. 1.35

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.50@1.75

Piqua, O. — Analysis, 82.8% $CaCO_3$, 8.2% $MgCO_3$; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh ..... 3.25@5.00

50% thru 50 mesh ..... 1.75@2.00

Ridgeville, Ind.—Analysis, 98% $CaCO_3$ 100% thru 4 mesh 1.75

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@1.40

Spring Valley, O. — Analysis 95.92% $CaCO_3$, 2.15% $MgCO_3$; 100% thru 10 mesh, bulk 3.00

Stolle, Ill., near East St. Louis on I. C. R. R. — Thru ½-in. mesh — Analysis, 89.61% to 89.91% $CaCO_3$, 3.82% $MgCO_3$ 1.75

Stone City, Ia.—Analysis, 98% $CaCO_3$ —90% thru 50 mesh ..... .80

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh 1.50

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Agricultural Limestone

(Continued from preceding page.)

Whitehill, Ill. — Analysis, 97.12% $CaCO_3$, 2.50% $MgCO_3$ — 90% thru 100 mesh 5.00
50% thru 50 mesh 2.00
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk 4.25
SOUTHERN:
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh 4.75
Cartersville, Ga.—Analysis, 96% combined carbonates — pulverized limestone ..... 1.75@2.00
Claremont, Va. (Marlime) — Analysis, 90% $CaCO_3$, 2% $MgCO_3$—90% thru 50 mesh; bulk 3.50
Dittlinger, Tex. — Analysis, 99.09% $CaCO_3$, .04% $MgCO_3$—90% thru 100 mesh ..... 2.00@3.00
90% thru 4 mesh ..... 1.00@2.00
Grovania, Ga.—Analysis, 95% $CaCO_3$, no $MgCO_3$—50% thru 100 mesh 2.50
Hopkinsville, Ky. — Analysis, 94.6 to 98.1% $CaCO_3$; bulk 2.00
Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh 2.00
90% thru 50 mesh 1.50
Ladds, Ga.—Pulverized limestone 2.50
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk 3.00
Mascot, Tenn.—Analysis 52% $CaCO_3$, 38% $MgCO_3$.
80% thru 100 mesh 3.00
All thru 10 mesh 2.50
80% thru 200 mesh 5.00
Paper bags, $1.50 extra per ton; burlap, $2.00 extra per ton.
Maxwell, Va. 2.50
Ocala, Fla. — Analysis, 98% $CaCO_3$— 75% thru 200 mesh 4.50
WESTERN:
Colton, Calif.—Analysis, 95% $CaCO_3$, 1½% $MgCO_3$—all to pass 14 mesh; bags, 6.50; bulk 5.50
Sacks, 15c extra, returnable.
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g— 50% thru 100 mesh; bulk 2.00
Terminus, Calif. — Analysis, 96.2% $CaCO_3$, .04% $MgCO_3$—60% thru 200 mesh, 90% thru 100 mesh, 95% thru 50 mesh, 100% thru 4 mesh; sacks, 6.00; bulk 5.25
Tulsa, Okla.—90% thru 4 mesh ..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:
Baltimore, Md. ..... 2.25@2.75
Berkley Springs, W. Va. ..... 2.00@2.25
Cedarville and South Vineland, N. J. 2.00
Cheshire, Mass. ..... 5.00@7.00
Gray Summit, Mo. ..... 2.50@4.00
Hancock, Md.—Damp ..... 2.50@3.50
Klondike and Pacific, Mo. ..... 2.50@3.00
Mapleton, Pa.—Dry 2.50
Damp 2.00
Massillon, Ohio 3.00
Millington, Ill. 1.75
Mineral Ridge, Ohio 3.00
Montoursville, Pa.—Green, washed ..... 1.50@2.00
Oregon, Ill.—Large contracts 1.75
Ottawa, Ill. ..... 1.25@2.25
Pittsburgh, Pa.—Dry, 4.00; damp 3.00
Rockwood, Mich. ..... 3.25@3.50
Round Top, Md.—Damp 2.00
St. Mary's, Pa.—Unwashed 2.40
Thayers, Pa. ..... 1.75@2.00
Utica, Ill. ..... 1.75@2.25
Zanesville, Ohio 2.50
FOUNDRY SAND:
Albany, N. Y.—Glass and sand blast .. 2.00@7.00
Core ..... 1.50@2.50
Furnace lining ..... 2.50@3.00
Molding fine, coarse and brass ..... 2.00@2.75
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse ..... 1.50@1.75
Arenzville, Ill.—Molding fine ..... 1.40@1.60
Beach City, O. — Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse ..... 2.25@2.50
Bowmantown, Pa.—Core ..... 1.35@1.50
Molding, coarse ..... 1.80@2.00
Cleveland, O.—Molding coarse ..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, O.—Core ..... .40@1.25
Sand blast ..... 3.50@4.50
Furnace Lining 2.00
Molding fine ..... 1.50@2.25
Molding coarse ..... 1.50@2.25
Stone sawing 1.50
Traction ..... .40@ .75
Brass molding 2.50
Conneaut, O.—Molding fine ..... 2.25@2.50
Molding coarse ..... 2.00@2.25

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	**.75**	**.75**	**.75**	**1.00**	**1.00**	**1.00**
Buffalo, N. Y.	1.10	.95	.85	.85	.85	.85
East Hartford, Conn.			.75 per cu. yd.			
Erie, Pa.		1.00		1.15		1.75
Farmingdale, N. J.	.48	.48			1.40	
Hartford, Conn.	**.90**		**1.25**	**1.15**	**1.15**	**1.15**
Leeds Junction, Me.		**.60@ .75**	**2.00**	**1.75**	**1.65**	**1.50**
Ludlow, Mass.	**.75•**	**.75•**	**1.70**		**1.50•**	**1.50•**
Philadelphia, Pa.	.75	.75	1.25	1.25	1.40	1.40
Pittsburgh, Pa.		1.30	1.30	1.30	.85	.85
Portland, Maine		.50	1.75		1.35	1.35
Texas, Md.		1.00		Pure white sand, 1.50		
Washington, D. C.	.60@ .75	.60@ .75	2.00	1.40	1.20	1.10@1.20
CENTRAL:						
Alton, Ill		.85				
Anson, Wis.	.50	.50		1.00		.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.60	.70	.70	.70	.70
Beloit, Wis.		.60	.60		.60	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, O.	.90	.90@1.25	1.25	.90@1.25	.90@1.25	.90@1.25
Des Moines, Ia.	.90	.65	1.60	1.60	1.60	1.60
			25% gravel, .90; 50% gravel, 1.15			
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.50	.50	1.00@1.25	1.00	1.00	
Elgin, Ill.		.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.70	.58	.90	.90	.72	.72
Estill Springs, Ky.	1.15	1.15		1.00		.90
Grand Rapids, Mich.		.55		.90	.85	.85
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Hawarden, Ia.		.70			1.60	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Le Mars, and Doon, Ia.		.90		1.80		
Lincoln, Neb.		Sand .40, sand and gravel .80, drained for shipment				
Mason City, Ia.	.90	.80	1.90	1.80	1.70	1.65
Milwaukee, Wis.	1.15	1.15	1.25	1.25	1.25	1.25
Minneapolis, Minn.	.35@ .50	.35@ .50	1.50	1.50	1.50	1.25@1.50
Moline, Ill.	.70	.70	1.20	1.20	1.10	1.10
Oxford, Mich.	.35	.35		.85	.70	.70
Riton, Wis.		.40			.60	
St. Louis, Mo., f. o. b. cars	1.60	1.65	1.80	1.60		1.55
Summit Grove, Clinton, Ind.	.90	.90	.90	1.00	1.00	1.00
Terre Haute, Ind.	.75	.75	1.25	1.00	.85	.85
Winnipeg, Man.	1.90	1.90		3.25		2.85
Winona, Minn.	.60	.50	1.50	1.50	1.25	1.25
Yorkville, Moronts, Oregon and Sheridan, Ill.		.60@ .80	.70@ .80	.70@ .80	.70@ .80	.60@ .80
SOUTHERN:						
Alexandria, La.	.60@ .90					1.65@1.85
Charleston, W. Va.			Sand 1.40—Gravel 1.50			
Estelle Springs, Tenn.	1.15	1.15	1.00	1.00	.90	.90
Ft. Worth, Tex.	**2.00@2.25•**	**2.00@2.25•**	**2.75@3.00•**	**2.75@3.00•**	**2.75@3.00•**	
Jedburg, Mo.		1.05	1.20	1.00	1.00	.95
Knoxville, Tenn.	1.15	1.15		2.15	1.95	1.75
Macon, Ga.		.75@1.00				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.	1.30	1.30		1.40		1.00
New Orleans, La.	**1.00**		**1.75**		**1.25**	
Pine Bluff, Ark.	1.00@1.25	.80@1.05	Washed gravel, all sizes, 2.20			
Roseland, La.				1.25		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.			(Kaw River sand, car lots, .75 per ton, Missouri River, .85)			
Niles, Calif.	1.00	1.00	1.40	.85@1.00	.85@1.00	.85@1.00
Pueblo, Colo.	1.25•	1.00•			1.50•	
San Diego, Calif.		.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.50	1.50	2.00	1.50		1.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Ia.			.80 per ton—1.20 washed			
Detroit, Mich.	1.10•					
Dudley, Ky. (Crushed Sand)		1.05		1.00		
Elkhart Lake, Wis.			Washed gravel .66			
Estelle Springs, Tenn.						.90
Fishers, N. Y.	.65@ .85	.75@ .85				.65@ .85
Glenville, N. Y.				1.00•		
Hamilton, O.			6 in. and less, .20 per ton			
Hartford, Conn.		**1.00•**				
Hersey, Mich.				.60	.60	.60
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Janesville, Wis.		.65			.65@ .75	
Lindsay, Tex.						.60
Oxford, Mich.					.50	
Pine Bluff, Ark.			Road gravel .60			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand 1.70			
Summit Grove, Ind.	**.65**	**.65**	**.65**	**.65**	**.65**	**.65**
Valde Rouge, La.						.85
Waco, Texas		.80		1.50		1.30
Winona, Minn.	.70					
Yardville, N. J.		**.50@ .75**				
York, Pa.		1.10@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey		1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.		1.25	1.25	1.25	1.25	1.25	1.25
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania		1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, O.	2.40		other grades 1.75@2.00				
Jackson, O.	2.00	1.35	1.70	1.35	1.35	1.35	1.35
Stuebenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	2.20	1.70	1.95	1.95	1.95	1.70	1.70
Youngstown, Dover, Hubbard, Leetonia, Struthers, Steubenville, Lowellville & Canton, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.00@1.25	1.15	1.05@1.10	.85@1.00	.85@ .90
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.00@1.25	1.15	1.05@1.10	.95@1.00	.85@ .90
Longdale, Goshen, Glen Wilton & Low Moor, Va.	2.50	1.00	1.35	1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.		8.00	58 to 65	0.5 to 1.0	
Bellefonte, Pa.	8.50		98.2	.72	11.50
Branchton, Pa.		5.50			
Cassadaga, N. Y.—Marl		8.00@10.00	48.07	1.08	
Chippewa, Pa.	5.50		78.67	1.33	
Hot Springs, N. C.	3.00	4.50			
Lime Ridge, Pa.	5.75		80.56-62.71	3.87-1.96	
Lime Ridge, Pa.	6.00@7.50		80.56-62.71	3.87-1.96	
Paxtang and Le Moyne	5.00		Bulk, run of kilns		
Rockland, Maine		8.00	65	1	
Rosendale, N. Y.	7.00		84	7	(bulk) 6.00
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.00	10.00	75	3	10.00
West Rutland, Vt.	4.50	7.50	68	3	
West Stockbridge, Mass.					15.00
Williams and Blue Bell, Pa.		8.25	57	33	11.25
York, Pa.	7.50		92	3	10.50
CENTRAL:					
Alton and Hannibal, Ill.	11.50		95		
Delaware, Ohio			50	5-12	9.00
Knowles and Valders, Wis.	5.00	9.00	55	45	12.50
Marblehead, O.			85.10	12.92	9.50
Mitchell, Ind.					12.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Woodville, Ohio			48	33	9.25
SOUTHERN:					
Burns, Tenn.	9.50		96	0.54	12.00
Claremont, Va. (Marl.)	5.00	7.00	85-95	2-5	
Erin, Tenn.	7.50		97.82	0.12	
Karo, Va.	8.50		97	1.25	
Knoxville, Tenn.	9.00		98.23		13.00
Staunton, Va.	7.50	8.75	70	10	
WESTERN:					
Colton, Calif.			97	2	15.00
Kirtland, N. Mex.	12.00				
San Francisco, Calif.			98-99	.5-.75	19.50
Tehachapi, Cal.	12.00@15.00	14.00@17.00	98	1.00	

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Core	1.50
Molding fine and coarse	1.50
Brass molding	1.50
Dunbar, Pa.—Glass sand No. 2, damp	3.00
Traction, damp	2.75
Dundee and Chalfants, O.—Sand blast	3.00
Glass, core and traction	2.75
Molding fine and brass molding	2.25
Furnace lining	2.50
Molding coarse	2.00
Eau Claire, Wis.—Core	.75@1.25
Sand blast	3.00@4.25
Traction sand	.50
Franklin, Pa. and Utica, Pa.—Traction	2.50
Brass molding	2.25
Core	1.50@2.00
Molding fine	2.25
Molding coarse	2.00
Sand blast	5.00
Greenville, Ill.—Molding coarse	1.30@1.50
Howard, O.—Glass sand	3.00@3.25
Steel molding	2.25@2.50
Joplin, Mo.—Stone sawing and roofing	1.25
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and stone sawing	1.65
Klondike and Gray Summit, Mo.—Molding fine	2.00@2.50
Molding coarse	2.50@3.00
Mapleton, Pa.—Core, furnace lining, molding coarse and brass molding	2.00@2.75
Molding fine	2.25@2.75
Roofing sand	2.00@3.00
Sand blast	1.50@2.00
Massillon, O.—Glass sand, molding fine and coarse, core, and furnace lining	3.00
Traction	3.00
Michigan City, Ind.—Core, glass, traction and brass molding	.60
Millington, Ill.—Glass, core, furnace lining, roofing and stone sawing	1.75
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.25
Montoursville, Pa.—Core	1.25@1.50
Traction	1.00@1.25
Brass molding	1.50@1.75
New Lexington, O.—Molding fine	2.25
Molding coarse	2.00
Sand blast	3.00
Glass, core and traction	2.75
Furnace lining	2.50
Brass molding	2.25
Oregon, Ill.—Core and glass sand	2.00
Furnace lining	2.00
Molding fine and coarse	1.00
Sand blast	3.50
Stone sawing	2.00
Ottawa, Ill.—Crude silica sand	1.00@1.25
Core, molding, fine and coarse	1.00@2.25
Furnace lining	1.25@2.00
Roofing and traction	1.25@5.00
Sand blast	4.00@5.00
Stone sawing	1.50
Ottawa, Minn.—Core	2.00@2.50
Glass, molding coarse, roofing, stone sawing (all crude silica)	1.25
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20

Miscellaneous Sands

(Continued)

Rockwood, Mich.—Core	2.75@3.00
Roofing	3.50
Sand blast	3.50@4.00
San Francisco, Cal.—Glass and roofing	3.00@3.50
Core, molding fine and brass	2.30@2.60
Furnace lining and molding coarse	3.60@4.25
Coarse core sand	3.60@4.25
Sand blast	2.30@3.60
Stone sawing and traction	2.30
Thayer, Pa.—Traction	1.75
Furnace lining	1.00
Molding fine and coarse	1.00
Core, green	1.50@1.75
Utica, Ills.—Core	1.10
Furnace lining	1.10
Molding fine	.85
Molding coarse	.85
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	2.50
Same, green	2.25
Williamstown Junction, N. J.—Glass sand	2.80@2.90
Core, wet	2.50@2.60
Zanesville, Ohio—Molding fine and Brass	2.25
Molding coarse	2.00
Furnace lining	2.50
Glass, core and traction	2.50
Sand blast	2.75
Steel molding	2.50
Pulverized silica thru 140 mesh	8.50
Thru 200 mesh	9.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	50.00
Blanks, per lb.	.08
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt.—Ground talc (150-200 mesh), bulk, 10.50@12.00; bags	12.00@14.00
Emeryville, N. Y.—150-200 mesh; bags	14.00
Glendale, Calif.—Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Gouverneur, N. Y.—Crude talc	4.00
Ground Talc (50-300 mesh)	13.50@15.50
Hailsboro, N. Y.—Ground Talc (150-200 mesh)	15.00@20.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@ 3.25
Ground talc (20-50 mesh), bags, 5.50@7.00; (200-350 mesh) bags	9.25@13.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	8.50@15.00
(Bags extra)	
Keeler, Calif.—Ground talc (200-300 mesh), bags	18.75@32.00
(Bags extra)	
Los Angeles, Calif.—Crude talc	10.00
No. 1	10.00
Ground talc, No. 2	16.00
Silver Talc Dust, 600 mesh	5.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@15.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	8.50
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	18.00	30.00@45.00
Bellow Falls, Vt.	20.00	35.00
Birmingham, Ala.	16.00	27.50@50.00
Bridgeport, Conn.	31.00	32.00
Buffalo, Niagara Falls and Rochester, N. Y.	21.00	
Eau Claire, Wis.	20.00	30.00@40.00
Houston, Tex.		22.00
Lockport, N. Y.	17.00	
Milwaukee, Wis.	17.00@18.00	35.00@150.00
Omaha, Nebr.	26.00	33.00
Piqua, O.	18.00	25.00
Portland, Ore.	25.00	43.00@73.00
Fancy brick	100.00@150.00	
St. Paul, Minn.	15.00	32.00
Springfield, Ill.	18.00	20.00@25.00
Tonawanda, N. Y.	20.00	
Virden, Ill.	18.00	20.00@25.00
Winnipeg, Man., Can.	19.00	40.00

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$8.10
24x14	9.30	8.40	8.10	8.10
22x12	10.72	8.70	8.77	9.10
22x11	10.72	8.70	8.77	9.10
20x12	10.72	8.70	8.77	9.10
20x10	11.70	9.60	9.42	9.42
18x10	11.70	9.60	9.42	9.42
18x 9	11.70	9.60	9.42	9.42
16x10	11.70	9.60	9.42	9.42
16x 9	11.70	9.60	9.42	9.42
16x 8	11.70	9.60	9.42	9.42
18x12	11.05	9.30	9.10	9.10
16x12	11.05	9.30	9.10	9.10
14x10	11.05	9.30	8.77	8.77
14x 8	11.05	9.30	8.77	8.77
14x7 to 12x6	10.40	9.00	8.45	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.50	$5.75
22x11	9.10	7.75	7.75	5.75
Other sizes	9.10	8.10	8.45	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

Granulated slate per net ton, f. o. b. quarries, Vermont and New York, 7.50.

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Bound Brook, N. J.—Trap rock, carload lots; bulk		2.30
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	10.00@15.00	10.00@15.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	30.00@35.00	20.00@25.00
Milwaukee, Wis.		21.00@30.00
Missouri river points — Different colors	20.00@25.00	20.00@25.00
Piqua, O.—Marble	8.00@10.00	8.00@10.00
Sioux Falls and Red Granite, Wis.	7.50	7.50
Tuckahoe, N. Y.—White marble	7.00@12.00	12.00
Crushed white stone and marble dust in 100 lb. bags	6.50@12.00	
Tate, Ga.—White limestone, sacks extra	5.00@ 7.00	5.00@ 7.00
Wausau, Wis.	14.00@18.00	
Wisconsin and S. Dak. points—Granite, different colors, bulk or sacks	1.50@ 2.00	3.00@ 7.00
Granite dust in bags	6.00	

Crushed Gypsum

Akron, N. Y.	3.50
Alabaster, Mich.	3.50
Blue Rapids, Kas.	3.50
Castalia, Ohio	3.50
Centerville, Ia.	3.50@4.20
Fort Dodge, Ia.	3.50
Grand Rapids, Mich.	3.50
Gypsum, Ohio	3.50
Gypsumville, Man., Can.	3.50
Hanover, Mont.	5.00
Loveland, Colo.	3.50
Oakfield, N. Y.	3.50
Plasterco, Va.	4.50
Port Clinton, Ohio	4.50
Rapid City, S. D.	5.00
Saltville, Va.	4.50
Southard, Okla.	3.50
Winnipeg, Can.	5.50

Ground Gypsum

Alabaster, Mich.	4.50
Blue Rapids, Kas.	4.50
Fort Dodge, Iowa	4.50
Grand Rapids, Mich.	4.50
Gypsum, Ohio	4.50
Loveland, Colo.	4.50
Oakfield, N. Y.	4.50
Southard, Okla.	4.50

Agricultural Gypsum

Akron, N. Y.	4.50
Blue Rapids, Kas.	7.50
Castalia, Ohio	6.00
Centerville, Ia.	4.50@7.00
Fort Dodge, Ia.	7.50
Garhutt, N. Y.	7.50
Grand Rapids, Mich.	7.50
Gypsum, Ohio	7.50
Loveland, Colo.	7.50
Mound House, Nev.	7.50@8.00
Oakfield, N. Y.	7.50
Piedmont, S. D.	7.50
Plasterco, Va.	7.00
Southard, Okla.	7.50

Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 68%	6.00@7.00
B.P.L. 70% to 75%	6.00@9.00
Mt. Pleasant, Tenn., analysis, 65-70% B.P.L.	6.00@7.50
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00
Wales, Tenn.—B.P.L. 70%	6.00@8.00

Ground Rock

Per 2000-lb. Ton

Centerville, Tenn.—B.P.L. 70%—90% thru 100 mesh	9.00@10.00
B.P.L 75% (brown rock)	12.00
Mt Pleasant, Tenn — B.P.L. 68%—13% Phosphorus	7.50@9.00
14% Phosphorus	8.00
B.P.L. 65@70%	7.00@9.00
Norwills, Fla.—(Fla. Hard Rock)—B.P.L. 68%	10.00

Florida Soft Phosphate

Raw Land Pebble

Per Ton

Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

Per Ton

Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Lakeland, Fla.—B.P.L. 72%	13.50
B.P.L. 60%	6.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	8.00
Barton, Wis.	14.00
Bloomfield, Ont.	16.00
Boston, Mass.	13.50@15.00
Brighton, N. Y.	15.00
Buffalo, N. Y.	16.50
El Paso, Texas	14.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	13.50
Lancaster, N. Y.	14.50
Michigan City, Ind.	11.00
Miller, Ind.	10.00@10.50
Milwaukee, Wis. (delivered at job)	17.50
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.—Common	15.00
Face	25.00
Redfield, Mass.	15.00
San Antonio, Texas—Common	16.00
Face	24.00
South Dayton, Ohio	14.50
Syracuse, N. Y. (delivered at job)	20.00
F. o. b. cars	18.00
Toronto, Can.	15.00
Washington, D. C.	14.50
Winnipeg, Can. (less $1 trade disc.)	16.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton: Finishing	Hydrate per Ton: Common
Atlanta, Ga.	21.00	17.00
Baltimore, Md.	22.25	17.50
Boston, Mass.	22.25	21.25
Cincinnati, Ohio	16.70	14.50
Chicago, Ill.	20.00	.....
Dallas, Tex.	27.50	25.00
Denver, Colo.	.....	16.00
Detroit, Mich.	22.00	19.00
Gypsum, O.	.....	13.40
Fort Dodge, Ia.	.....	15.15
Los Angeles, Calif.	.....	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	30.00	.....
New Orleans, La.	.....	17.00
New York, N. Y.	21.00	19.00
Oakfield, N. Y.	.....	16.20
Plasterco, Va.	.....	19.30
St. Louis, Mo.	26.00	20.00
San Francisco, Calif.	24.40	22.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net): Finishing	Lump per 180-lb. Barrel (net): Common
Atlanta, Ga.	1.60	1.50
Baltimore, Md.	(ton)	12.75
Boston, Mass.	3.50	3.25
Cincinnati, Ohio	(ton)	14.50
Chicago, Ill.	.....	1.75
Dallas, Tex.	.....	3.00
Denver, Colo.	3.00	.....
Detroit, Mich.	2.00	1.80
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.80	1.50
Montreal, Que.	15.00	(ton)
New Orleans, La.	2.75	2.00
New York, N. Y.	3.50*	3.30*
St. Louis, Mo.	.....	2.50*
San Francisco, Calif.	.....	2.25*
Seattle, Wash.	3.25	.....

* 280-bbl. (net).

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga.	2.60
Baltimore, Md. (del.)	3.58
Birmingham, Ala	3.05
Boston, Mass.	2.86
Cedar Rapids, Ia.	2.51
Cincinnati, Ohio	2.57
Cleveland, Ohio	2.43
Chicago, Ill.	2.17
Dallas, Tex.	2.60
Davenport, Ia.	2.47
Denver, Colo.	3.10
Detroit, Mich.	2.43
Duluth, Minn.	2.10
Indianapolis, Ind.	2.43
Kansas City, Mo.	3.20
Los Angeles, Calif.	3.31
Milwaukee, Wis.	2.39
Minneapolis, Minn.	2.41
Montreal, Que.	3.44
New Orleans, La.	3.36
New York, N. Y.	2.40
St. Louis, Mo.	3.00
San Francisco, Calif.	3.09
Seattle, Wash.	3.10
Winnipeg, Man.	1.00

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

Mills	Stucco * Calcined Gypsum	Cement † and Gauging Plaster	Wood Fiber	White § Gauging	Gypsum Plaster Board ¼x32x36" Wt.1500 lbs. Per M Sq. Ft.	Sheetrock Wallboard ⅜x32 or 48" ¼x32x36" Wt.2000 lbs. Per M Sq. Ft.	Sheetrock Wallboard ⅜ Lgths 6'-10' 2000 lbs. Per M Sq. Ft.
Blue Rapids, Kan.	9.00	11.00	11.50	11.00	19.375	20.00	41.75
‡ Eldorado, Okla.	.....	11.00	11.50	.....	27.20	29.30	44.55
Fort Dodge, Ia.	9.00	11.00	11.50	16.45	19.375	20.00	35.00
Grand Rapids, Mich.	9.00	11.00	11.00	19.50	19.375	20.00	35.00
Gypsum, O.	9.00	11.00	11.00	20.25	19.375	20.00	35.00
Loveland, Colo.	9.00	11.00	11.50	.....	.....	.....	.....
Oakfield, N. Y.	9.00	11.00	11.00	21.20	19.375	20.00	35.00
Piedmont, So. Dak.	9.00	11.00	11.50	.....	27.97	31.04	46.18
Plasterco, Va.	9.00	11.00	11.00	21.90	21.375	22.00	.....
‡ Southard, Okla.	9.00	11.00	11.50	11.00	26.20	28.70	44.40

* Shipment in bulk 25c per ton less. ‡ Acme, Tex., freight rates govern. † Bond Plaster $1.50 per ton additional. §White Moulding 50c per ton additional.

(NOTE: Returnable Jute Bags—15c each; $3.50 per ton. Paper Bags—$1.00 per ton extra.

General Market News

Indiana Returning to Macadam and Gravel Roads

THE Indiana State Highway Department is seeking to obtain federal aid in the construction of stone and gravel roads the same as it now is obtaining Federal aid in the construction of hard surface roads, C. Gray, chief engineer for the department, reports. He is preparing plans and specifications, applicable for use on any highway, for the construction of stone and gravel roads and will send them to the Federal Bureau of Public Roads to see whether the Federal authorities will co-operate with the state in such construction.

The state department will build only the most necessary hard surfaced roads while material costs entering into such construction are so high, it has announced repeatedly. It also has declined thus far to build many stone roads because, it is alleged, the stone producers have not reduced their prices in accordance with what the department officials believe to be in line with the times. Gravel producers are said to have reduced their prices to a degree more satisfactory to the officials, although further reductions, they believe, should be made.

Consumers' Company Acquires Supply Firm and Ten Subsidiaries

THE CONSUMERS CO., of Chicago, has gained control of about 25 per cent of the sand, gravel, and crushed stone business of Cook County, by a merger perfected this month. It has absorbed the properties and equipment of the Cook County Supply Co., valued at $5,000,000.

The following organizations were included with the Cook County Supply Co. in the merger: United States Crushed Stone Co., McCook, Ill.; Argo Stone Co., Argo, Ill.; Illinois Stone Co., Lemont, Ill.; Universal Stone Co., Racine, Wis.; Lake Shore Sand and Gravel Co., Algonquin, Ill.; Federal Sand and Gravel Co., Beloit, Wis.; Producers' Material Co., Agricultural Brownstone Co., and the Artesian Stone Co., Chicago; and the United States Building Material Co., which has been the operating organization for the Cook County Supply Co. enterprises.

The transaction brought about an important change in the executive personnel of the Consumers' Co. William H. Leland, senior vice-president, has resigned to engage in other business and H. M. Hallock, who has been president of the Cook County Supply Co., will succeed him and will continue as executive head of the merged companies.

Four Hundred Exhibitors at National Chemical Show

THE GREATEST AND BEST Chemical Exposition will be held September 12-17 at the Eighth Coast Artillery Armory, New York City. Four hundred exhibitors covering every branch of the rapidly growing American chemical industry have already signified their intention of taking space. The rock products industry is to be congratulated that the lime industry, through its progressive National Lime Association, is among these.

Every effort will be made to drive home to both chemists and the general public that lime is *the* most important basic chemical. The exhibit of the National Lime Association will be educational in character and designed to show the multitudinous uses of lime in the chemical industries as well as illustrate the methods of lime manufacture and the various forms of lime.

A part of the program of special interest to rock products men consists of papers by H. F. Kleinfeldt, of Abbe Engineering Co. on "Ball and Pebble Milling for Pulverizing and Mixing"; S. B. Kanowitz of Raymond Bros. Impact Pulverizer Co. will have a paper on "Grinding and Pulverizing with Air Separation"; L. H. Sturtevant of Sturtevant Mill Co., will complete this subject with "Crushing and Grinding Phosphate Rock."

On Mining and the Chemical Industries a moving picture program is scheduled with films on "The Story of Rock Drilling," "Iron Mining Operations," "Mining Magnetic Iron Ore," "Zinc Mining, Milling and Smelting," "Manufacture of Zinc Oxide," "Mining and Extraction of Radium from Carnotite Ore," "Mine Explosion and Rescue," "Exterminate the Mosquito."

Handling of Material includes "Saving Wasted Millions through Material Handling Equipment," "Use of the Steam Shovel in Mining," "Transportation and Storage of Iron Ore," "Transporting and Handling Coal by Various Means," "Dredging Anthracite Coal."

New Lime Publication for Virginia Farmers

VOLUME 1, NUMBER 1, of the "Lime Light" is the issue for July, 1921. It is to be published quarterly by the Herald Company at Claremont, Va., in the interest of land building and better sires, and its object will be to educate the farmers in the use of "marlime" in agriculture. The producer of "marlime" is the Claremont Marl Products Co.

The New Luckey Lime Plant Formally Opened

THE LIME PLANT of the Luckey Lime and Supply Co. at Luckey, Ohio, was formally opened on July 19. About one year ago the formal opening of the quarry was held on the site of the new plant.

During the morning the crowds were conducted on inspection trips through the plant by C. C. Martin, the general manager, and by other officials of the company. About one-third of the stockholders were present. At noon a buffet lunch was served on the grounds, after which a business meeting of the stockholders was held.

This plant will be fully described in an early issue of ROCK PRODUCTS.

California Gypsum Company Announces Plans for Development

THE California Gypsum Company, a California corporation capitalized for $1,000,000, has announced its plans for development. These plans include one of the most modern gypsum plants ever built which will be located in Imperial County about 5 miles north of Coyote Wells. It further plans the erection of a gypsum wall-board factory in San Diego.

A narrow gauge railway to be constructed at an estimated cost of $350,000 will connect the gypsum plant with the San Diego and Arizona Railway.

It is reported that an unlimited supply of pure gypsum rock is available, suitable for the manufacture of the highest quality of wall plaster, plaster of paris, and other gypsum products.

F. S. Culver, Owen Moore (of "movie" fame), and John C. Scheufler of Los Angeles, Calif., are officials of the company. The main office is located at San Diego.

Steel Men Seek Reduction of Flux Stone Rates

THE QUESTION of railroad freight rates on ore, coke and limestone will be thoroughly threshed out at a meeting to be held in Pittsburgh, Pa., soon between traffic officials of the railroad serving this section of the country and blast furnace and steel plant interests of the Pittsburgh and Valley districts. Statistics compiled by the traffic manager of one of the Pittsburgh independent steel companies shows that the present cost of assembling the materials used in making a ton of pig iron, including a charge of 40 cents for slag disposal, is $10.44. This compares with $5.18½ in 1913 and $5.34½ in 1912.

News of the Industry

Incorporations

The **Keystone Stucco Co.**, of Detroit, has increased its capital stock from $10,000 to $25,000.

Canadian Benedict Stone, Ltd., Montreal, has been registered. It is capitalized at $230,000.

The **Marion Lumber and Fuel Co.**, Marion, Wis., has been dissolved.

The **Champion Sand and Gravel Co.**, Marquette, Mich., has increased its capital stock from $30,000 to $45,000.

The **Horicon Sand, Gravel and Tile Co.**, Horicon, Wis., has been incorporated by E. C. Abale and others. The capital stock is $40,000.

The **Central Gravel Supply Co.**, of Indianapolis, has filed notice with the secretary of state that the corporation will be dissolved.

The **Texas Stone Products Co.**, of Dallas, Tex., has increased its capital stock from $22,000 to $240,000.

The **Ideal Construction Co.** has been incorporated in Seattle, Wash., with a capital of $50,000, to deal in all kinds of building materials.

The **National Slag Products, Ltd.**, Hamilton, Can., has been incorporated with a capital of $300,000, to deal in slag, portland cement, etc.

Vancouver Cement Floor Co., Ltd., Vancouver, B. C., has been incorporated with a capital of $10,000.

Stonite Products, Ltd., Vancouver, B. C., has been incorporated with a capital of $200,000, to make artificial stone.

The Calcining Process, Ltd., Vancouver, B. C., has been incorporated for $9,000, to manufacture lime and cement.

Petrified Products, Ltd., Vancouver, B. C., has been incorporated with a capital of $50,000, to manufacture brick, tile and pottery.

The Northwest Gypsum Products Co., Seattle, Wash., has been incorporated for $10,000 by H. C. Belt, G. J. Fairbrook, and G. P. Haight.

The Lincoln Crushed Stone Co., Lincoln, Kans., with a capital stock of $15,000, has been incorporated by J. C. Paslay, F. S. Munch, and E. F. Decker.

The Farmingdale Gravel and Concrete Products Co., Brooklyn, has been incorporated for $40,000. Directors are R. A. Higginson, H. A. St. George and A. S. Martin.

The Perry Sand Co., New Lexington, Ohio, has been incorporated for $30,000 by Tom O. Crossan, Edward R. Meyer, Homer E. Walter, W. M. Bell and E. K. Sprague.

The Buffalo Building & Material Co. has been incorporated in Tulsa, Okla., with a capital of $100,000, by A. C. Porter and N. A. Hays, of Tulsa, and A. C. Parkinson, of Pawhuska, Okla.

The Midland Brick and Concrete Block Co. has been incorporated in Charleston, W. Va., with a capital of $50,000, by James E. Jackson, H. F. Gamble and A. Hall Whitefield.

The Hermitage Marble Works has been incorporated in Nashville, Tenn., with a capital of $500,000, with Lewis Butler as general manager. Has 300 acres of quarry fields.

The Carolina Sand and Gravel Co., of Carthage, N. C., has been reorganized, with L. C. Dilka as president, New York, and J. C. Bittle, manager, Carthage.

The Little Piney Sand and Gravel Co. has been incorporated in Rollo, Mo., with a capital stock of $20,000, by C. B. E. Denton, J. A. Clark and W. R. Bennett.

The Independent Sand and Gravel Co., Ltd., Vancouver, B. C., has been incorporated with a capital of $100,000, to deal in sand, gravel and stone.

The Merritt Concrete Products Co., Santa Clara, Calif., has been incorporated for $300,000 by R. Convery, Roy A. Bronson, V. Berges, S. L. Hooper and C. F. Tramutolo.

The Wisconsin Grain Co., Sharon, Wis., was incorporated for $50,000 by H. P. Ratzlow, A. C. Peters, and J. L. Chester. It will also deal in cement and all building materials.

The Lampert Lumber Co. of St. Paul, dealers in building material of all kinds, has increased its stock from $2,000,000 to $2,500,000. L. Lampert, president.

The Bromide Crushed Rock Co., of Bromide, Okla., with a capitalization of $150,000, received its charter July 9. Incorporators are A. F. House, E. R. Jones and J. R. Murray, all of Muskogee.

The Markman and Huneke Sand and Gravel Co., Oquawka, Ill., has been incorporated for $100,000. John Markman is president and E. F. Huneke is secretary and treasurer of the new concern.

The Kelscity Stone Building Products Co. has been incorporated in Kelsey City, Fla., with a capital of $25,000, by H. G. Mitchell, president; Wm. Huestis, secretary, and A. T. Phillips, treasurer.

The Wisconsin Red Brick Co. of Menomonie, Wis., was incorporated for $50,000 by James P. McLean, Francis J. McLean, and Oscar Wilson, to manufacture brick, tile, sewer pipe, pottery, etc., from clay, shale, sand, silica, cement, etc.

The Milwaukee Crushed Stone Co., Milwaukee, Wis., was incorporated for $10,000 by Wm. T. Vanderboom, Frank E. Waldron, and Horace P. O'Hara. It will deal in all material used for construction purposes.

The Robinson Lime Co., of Anderson, Tenn., has been organized, with A. J. Robinson as president; H. M. Bates, treasurer; Arthur Crownover, secretary, and will build lime plant with daily capacity of 50 tons and install crushing and grinding machinery.

The Phosphate Products Co. has been incorporated in Mt. Pleasant, Tenn., with a capital of $25,000, and will erect a plant and install mills for ground and lump phosphate rock. H. W. Percival, of New York City, is president, and E. E. Fish, Mt. Pleasant, is secretary and treasurer.

Manufacturers

The Shaffer Engineering and Equipment Co., Pittsburgh, has combined its administrative, sales, and manufacturing departments in its new general offices at 2828 Smallman St., Pittsburgh. This new arrangement enables the company to render more efficient service as its entire organization is thoroughly coordinated and augmented with additional personnel and facilities.

The Pawling and Harnischfeger Co., of Milwaukee, has moved its San Francisco office from the Monadnock Bldg. to 32 Beale St. At this new address the company maintains a complete service station, warehouse and display room for cranes and hoists, machine tools and excavating machinery. R. M. Taylor, district manager for the Pacific Coast, has his headquarters at the Beale St. address.

The Austin Machinery Corp., Chicago, Ill., report what they believe to be a record for delivery of one of their 6-T cranes from the factory at Toledo, Ohio, to Tampico, Mex. The crane was shipped by rail to Port Arthur, thence by water to Tampico. The crane loaded on the boat and unloaded under its own power. The crane was on the job working just 26 days after receipt of the order.

The Pierce-Arrow Motor Car Co., Buffalo, N. Y., to demonstrate the advances made in motor truck design and construction made a run from New York City to Boston, Mass., with two of their trucks. The trucks making the run were Pierce-Arrow No. 1 which made the same trip in 1911, and had since seen 175,000 miles of service; and the latest model, a dual valve five-ton unit. The old truck made the trip in 17 hours and 40 minutes, 2 hours and 20 minutes less than in 1911, while the new model truck made it in 14 hours and 43 minutes.

The Terminal Engineering Co., 17 W. 44th St., New York City, manufacturer of the "Tec" truck and varied material handling machinery announces the following additions and changes in its organization: J. F. McGonigal, mechanical engineer, formerly of the Foamite Co. and J. H. Potter, mechanical engineer, a graduate of New York University, have joined the organization. M. E. Lyle for many years with the Columbia Graphaphone Co. has been elected a vice-president and is directly responsible for new business. M. E. Peck has been elected secretary and assistant treasurer of the company.

Pawling and Harnischfeger Co., of Milwaukee, has just issued Pamphlet TX, which describes and illustrates the new skimmer boom designed for attachment to the standard P. & H. 205 or 206 excavator-crane. The point is made that by replacing the standard boom of either of these cranes, an efficient road grading machine is provided. In fact, this is similar to the shovel attachment brought out earlier this year and which is designed for use with either of the two types of P. & H. cranes mentioned. Data and operating cost figures on a road grading job done by Wm. Datka, contractor, are included, together with a profile for the road, prepared by the county highway department.

The Allied Machinery Co. of America has been appointed foreign representative for the Universal Crane Co., of Elyria, Ohio. The Allied Machinery Co. has offices in all the large countries of the world and will have for their territory in respect to the products of the Universal Crane Co., all countries with the exception of the United States and Canada. The general offices of the Universal Crane Co. are in Cleveland. They manufacture a three to four ton portable electric or gasoline engine locomotive crane, arranged for mounting to suit working conditions. It is now being used mounted on motor truck in the street railway industry, for handling coal, dirt, sand, gravel. It is also extensively used by building supply dealers for loading unloading, and handling of building materials.

Quarries

The Alabama Marble Co., Sylacauga, Ala., has discovered a new vein of pure white marble about 300 yds. from its present quarry. A new quarry is being opened on this vein.

The Barre Granite Manufacturers' Assn. announced a reduction of 15 per cent in the price of finished granite. The cut was made, the association said, in an attempt to bring the monument business back to normal conditions.

The Colorado White Marble Co., of Denver, Colo., is opening up its quarries on Yule Creek, two miles from Marble, Colo. The finishing plant and general offices are in Denver, with Raymond A. Becker as president and general manager.

The Carthage Marble and Building Stone Company's stonecutters quit work at the Carthage, Mo., quarry July 21, on account of a disagreement that had arisen over the wage scale, which hitherto has been $8 a day. Notice was immediately served on the union to return to work within 24 hours or the operators would declare an "open shop."

E. R. Baldridge and Co., has recently completed a ganister crushing plant at their Barre, Pa., quarries. This firm has been engaged in the ganister business since 1889. Offices of the company are at Hollidaysburg, Pa. The crusher installed is a special type and was manufactured by the Good Roads Machinery Co. of Kennett Square, Pa. It has a return track elevator and a screen with four size screening surfaces. A fuel oil engine is used for motive power.

The Westline Crushed Rock Co., of Westline, Mo., has opened several quarries from which it is shipping about twenty carloads of crushed stone a day. It is estimated that more than 10,000,000 tons of superior road-building material lies beneath one 105-acre farm held by this company. Both limestone and asphaltic rock are obtained, the limestone ledge having a face of about 45 feet. The extent of the asphaltic rock is unknown, but it is believed that the material is to be found in large quantities.

The Louisville Cement Coma Co., recently had moving pictures taken of their quarry at Milltown, Ind., when 9,000 pounds of dynamite was used to lift 80,000 tons of stone from the earth. The dynamite was placed in 21 holes, each 4 in. in diameter, drilled 100 feet deep. The shot is believed to have been the largest ever made in this sction of th country. A party of Evansville people were guests of Philip D. Fry, representative of the company in that section, and he entertained his guests at luncheon here.

The Consolidated Stone Co. mills northwest of Bloomington, Ind., were recently destroyed by fire, which is thought to have started from combustion in blacksmith coal. A. E. Dickinson, of Bedford, the Cleveland Sandstone Co., and New York and Chicago capitalists are the principal owners of the mills. Ten saw gangs, twelve planers, three diamond saws and three travelers were burned, and about $15,000 worth of cut stone, ready for shipment to Chicago, was lost. The total loss is estimated at $250,000, with insurance of about $125,000. The mills were built about four years ago.

Crushed Stone

R. H. Riddles of Susanville, Calif., is building a rock-crushing plant to furnish stone for a paving contract recently awarded to the Warren Construction Co. W. B. Lyons is in charge of the construction work.

The Kelly Island Lime and Transport Co., Cleveland, Ohio, is constructing a 10,000-ton crushing plant at Marblehead, O. This plant will not be operated before next spring and will be used to produce flux stone principally.

Cement

The Coplay Cement Manufacturing Co., Coplay, Pa., which has been working on a half time basis at Mill "C," is now operating on a capacity schedule.

Philadelphia—Local portland cement manufacturers anticipate some good sized city jobs by fall. Business this year is said to have been mainly for small jobs, such as family residences and garages, but the aggregate is almost up to the business for the similar period in 1920.

The Rosoff Engineering Co., of New York, has taken possession of the Alsen Cement Works and the Marlborough Sand and Gravel Corporation, both of which were purchased at the receiver's sale on April 19. The total bid for the property of the Alsen Cement Co. was $591,000, which includes the two plants.

The Builders Association of Oklahoma City, Okla., has asked that the corporation commission of the state investigate the prices and practices of the Dewey Portland Cement Co. and the Oklahoma Portland Cement Co. Petition was made by R. G. Merriott, secretary of the association, and hearing set for August 2.

The International Cement Corporation has approved the proposal for the acquisition of the Knickerbocker Portland Cement Co., stock of which comprises 16,132 shares of preferred, par $100, and 156,670 shares of common, par $10. International Cement Corporation proposes to acquire these shares by exchange of one share of International preferred for each share of Knickerbocker preferred and one share of International common for every 2½ shares of Knickerbocker common.

Concrete Products

The Concrete Supply Co. is erecting a storage warehouse to cost $12,500 in Atlantic City, N. J.

Harry Grover and Henry Schriender, of Asbury Park, N. J., have recently erected a building to be used as a plant for the manufacture of cement blocks. They expect to start operation of the plant soon.

The Lock-Joint Pipe Co. is locating a plant at Webb City, Mo., to manufacture tile and cement pipe out of the Webb City chats. The company has shipped an array of forms to that city and has leased trackage front there. One large contract for storm sewers has already been secured from the city of Tulsa, Okla.

Sand and Gravel

Clark County, Alabama, will build a sand and gravel plant at Glendon, Ala., to furnish material to highway contractors.

The Callahan Sand and Gravel Co., of Cleveland are furnishing sand for the construction of 17½ miles of concrete highway being built by the Ohio State Highway Commission between Cleveland and Akron. Sand for this job is taken from pits at Kent, Ohio.

The Warsaw Sand and Gravel Co. has recently made its first shipment of sand and gravel from the pits at Winona Lake, Ind. The new company has been busy for several months removing surface ground and preparing for full operation of the plant, which is equipped with modern machinery and which is expected to have a capacity of from 15 to 20 cars a day.

The Evansville Sand and Gravel Co., Evansville, Ind., has been awarded the contract for supplying the sand and gravel for the new concrete guide walls at Lock No. 1, on Green River, at Spottsville, Ky., a few miles southeast of this city. The contract amount to 9,000 cu. yds. Col. J. L. Lukesh and W. H. McAlpin, district engineers for the United States government, were in Evansville a few days ago in connection with the contract. The concrete guides will take the place of the ones originally built of timber.

The Evansville Sand and Gravel Co. is again operating in the Mt. Vernon, Ind., section. The company's fleet, under the direction of H. H. Sarlls, manager, arrived a few days ago and now is stationed near the chute of Slim Island, where both sand and gravel are being taken from the bed of the Ohio River. The local plant has not been operated very much since the first of the year. The Ohio river is now at a low stage and sand and gravel boats can operate easier when the water is low.

Personal

J. MacFerran Taylor is a new member of the Pawling and Harnischfeger Co. sales department in the Pacific Coast district.

F. J. Russell, president of the Montana Phosphate Co., recently returned to Spokane from the East, where he had been in conference with McKeever Bros., of New York, in regard to their phosphate holding in Montana.

D. R. Collins, of the Portland Cement Association, Chicago, has been making an extensive trip through Eastern Montana. During July he visited throughout Rosebud County and made several talks on the use of concrete on the farm.

G. J. Whelan, general manager of the Kelly Island Lime and Transport Co., Cleveland, Ohio, says that the lime industry is gradually improving. Plants are now operating at about 60 per cent of their capacity.

N. S. Greensfelder, of the Hercules Powder Co., attended the official opening of the **Luckey Lime** and Supply Company's plant at Luckey, Ohio. He was accompanied by **H. C. King, who superintended** the firing of a large blast in the quarry.

W. D. Shipman and A. H. Koshman, of St. Louis, representing the Missouri School of Mines at Rollo, have been in Nordway County, Mo., making a survey of the gravel deposit to determine if it exists in sufficient quantity to make commercial marketing profitable.

Hon. Beniah Bowman, minister of mines for Canada, was a recent visitor to the feldspar mines north of Kingston. Great quantities of this material are shipped to Ohio, but it is now proposed to establish a grinding mill at or near Kingston which will powder and refine the feldspar ready for use in porcelain enamelling or tile.

Sand-Lime Brick

The Bay State Brick and Stone Co., of Haverhill, Mass., recently incorporated, has purchased the West Auburn property of the Worcester Brick Co., which has been idle about a year, and will reopen it at once. George L. Baldwin, a former manager, is an official of the Haverhill company. The plant was built by the Worcester Sand Lime Brick Co. several years ago.

Dealers

Tomkins Brothers, wholesalers and exporters of building materials, held their annual outing at Great Notch, N. J., on July 9. There were in all forty-five employees who attended the picnic, including those from the branch offices in New York City, Philadelphia, and Irvington, N. J. It was a jolly crowd which left the main office at Newark, N. J., in several of the firm's motor trucks and automobiles, forming no small parade as they journeyed to the pcinic grounds about fifteen miles from Newark. Baseball and other games were played, after which a sumptuous picnic feast was served by the girls.

These outings have come to be a regular annual event which is looked forward to by the entire organization. They go far to promote better acquaintance, as well as a feeling of good fellowship and closer co-operation among the people at the firm's various offices.

American Marble Quarries

REPORTS RECEIVED by the United States Bureau of Mines from operators of marble quarries throughout the country show that 4,438 men were employed in the industry during the year 1920; that each man averaged 294 working days during the year; and that the total number of shifts worked by all employes was 1,304,552. The number of employes and the total number of shifts represent an increase of 11 per cent each as compared with the record for 1919, while the average workign days per man is the same as for the previous year. More men were employed at marble quarries in 1920 than in any year since 1916, and the total shifts worked by all employes was larger than for any year since 1915.

Four employes were killed and 400 were injured by accidents during the year, 132 of the injuries occurring in and about the quarry pits, and 268 at the rock-dressing plants outside the quarries. In the pits 27 men were injured by handling rock, 22 by flying objects, 22 by drilling and channeling, 15 by machinery, 12 by falls of persons, and 11 by timber or hand tools. At the outside rock-dressing plants 162 men were injured by handling rock, 30 by machinery, 16 by nails and splinters, 15 by haulage accidents, 13 by falls of persons, and 11 by flying objects.

Considered by states, 231 men were injured at quarries in Vermont, 29 in Tennessee, 26 in Georgia, and 24 in Missouri.

Marble quarries employ approximately 5 per cent of all quarry workers in the United States.

Slate Quarry Operations

REPORTS received by the United States Bureau of Mines from operators of slate quarries throughout the country show that 3,496 men were employed in 1920, as against 3,373 employed in 1919. Each workman averaged 289 working days during the year, the total number of shifts for all employes being 1,009,244, an increase of about 20 per cent over the preceding year.

Accidents caused the death of five men and the injury of 364, showing a rate per thousand men employed of 1.49 killed and 108.20 injured, based upon a standard year of 300 working days. Of the total number of injuries, 224 occurred in and about the quarry pits, while 140 occurred at the outside rock-dressing plants. Of the accidents in and about the pits, 52 resulted from handling rock, 33 from falls or slides of rock or overburden, 19 from haulage accidents, 17 from machinery, 16 from flying objects, and 15 from falling objects. At the outside rock-dressing plants 40 men were injured while handling rock, 29 by machinery, 20 by haulage accidents, 11 by hand tools, and 9 by flying objects.

All of the 5 fatal accidents occurred at Pennsylvania quarries, which produce about two-thirds of all slate quarried in the United States. Pennsylvania also suffered 272 of the 364 nonfatal injuries, followed by Vermont with 77 men injured.

Slate quarries usually employ about 5 per cent of all quarry workers in the United States.

Rock Products

The Only Journal With a Paid Circulation in the Rock Products Industry

BUYERS' BULLETIN

MANUFACTURERS OF MACHINERY AND EQUIPMENT:—These inquiries are live, up-to-date inquiries that have come direct to us from the individual in each case.

READERS OF "ROCK PRODUCTS":—This Department is for your special help and service. If you do not see what you require advertised in "Rock Products," tell us your needs and we will publish them here. There is no charge for this service.

J. W. Parmley, Chairman, War Labor Board, Edmunds County Council of Defense, Ipswich, S. Dak., wants to hear from manufacturers of machinery suitable for washing and loading sand and gravel.

The John G. Duncan Co., of Jackson & Central Streets, Knoxville, Tenn., is in the market for dredging machinery for taking sand from bottom of river.

The Gray Concrete Co., of Thomasville, N. C., is in the market for roofing tile made of either clay or asbestos.

The Fort Worth Land & Gravel Co., of Fort Worth, Tex., is in the market for a small sized rock crusher.

W. J. Goff, 506 S. Evans St., El Reno, Okla., is in the market for a car loader and screening equipment.

Twining-Large Lime & Chemical Co., Carpentersville, N. J., write us as follows: "We desire full information regarding pulverizing equipment for pulverized limestone and bagging same, particularly cost of operation, etc. Which is the best machine, the swing hammer pulverizer or the roll type?" They also want catalogs on the following equipment: air compressors, bin gates, brick machinery, cars, clutches, drills, dust collecting systems, gas producers, gears, 50 K.W. 110 V. A.C. 60 cycle, 3 phase electric generators and 110 V. or 220 V. A.C. electric motors, pyrometers, sand washing boxes and steel and wood tanks.

New Castle Lime & Stone Co., Greer Bldg., New Castle, Pa., want catalogs and prices on concrete brick machinery.

Peach Bottom Slate Products Corp., E. H. Nichols, Engineer, Delta, Pa., write as follows: "Kindly put us in touch with firms that make electric car dumpers if there are any."

Todd & Cordes, Peapack, N. J., advise that they are in the market for lime hydrators.

J. L. McKinnery, Pelzer, S. Car., wants to know where he can buy a sand dryer to dry sand for fertilizer filler.

B. Blake, 301 N. Rock Island St., El Reno, Okla., advises that he is in the market for sand loading machinery, pump or excavator and also wants to know where he can buy sand washing machinery.

Crawford & Grieve, Ouray, Colo., want addresses of manufacturers dealing in supplies for lime kilns. "We have here a magnificent body of limestone. The geologists state it is the Pennsylvania lme and inasmuch as there is an active demand for good lime in construction now, we intend, if possible, putting it on the market. Where can we get the latest information in the construction of a modern lime kiln of say 100 tons per day capacity? We want both the continuous and other kind."

Wm. P. Nelson, Jr., Industrial Chemist, 904 Hennen Bldg., New Orleans, La., writes us as follows: "I have had the question arise as to whether it is possible to drill into or otherwise penetrate gravel deposits located below the waterline with the object of securing samples as well as ascertaining the depth and extent of the deposit. Inquiry among local interests that might be expected to be posted on this problem has failed to reveal any method of accomplishing this result. If it is within your province to do so I should be very glad if you could advise me in this respect or could put me in touch with any organization producing equipment to accomplish this purpose."

T. A. Corry, Consulting Engineer, care Peruvian Corp., Ltd., Lima, Peru, S. America, asks to have catalogs and data sent him on brick machinery, engines (gasoline and crude oil) and sand washing boxes.

Companhia Geral De Cal E. Cimento, 45, Rua do Alecrim, Lisboa, Portugal, advise that they desire catalogs and information on bagging machines, barreling machines, bin gates, conveying equipment, dust collecting systems, sand washing boxes, unloaders, weighing equipment, and wire cloth.

H. C. Moll, Consulting Engineer, Widows Fund Bldg., Adelaide, S. Australia, wants catalogs on blast hole drills, cableways, crushers, pulverizers, screens, steam shovels and stone grapple.

Industrial Pigment Co., Ltd., 137 Mitchell Rd., Alexandria, Sydney, New South Wales, Australia, wants catalogs on calcining machines, conveying equipment, crushers and dust collecting systems.

John Stone, Noonside, Natal, South Africa, wants catalogs and full data regarding crushers.

J. V. Haldus, Mgr. Sutua Stone & Lime Wks., Sutua, India, wants catalogs on the following equipment: air compressors, conveying belting, blast hole drills, cableways, calcining machinery, conveyors, cranes, crushers, dragline excavators, dump cars, gears, hoists, lime kilns, locomotives, perforated metal, pumps, screens, stone grapple and wire cloth and wire rope.

J. Thompson, Mgr. Kikurangi Lime Co., Kikurangi, New Zealand, wants catalogs and information on bags, screening plants, sand-lime brick machinery, lime hydrators, lime kilns, pulverizers, elevators and conveyors, crushers, chain hoists, blast hole drills, bins, and bagging machines.

SECOND HAND EQUIPMENT WANTED

N. J. Pulverizing Co., 15 Park Row, N. Y. City, wants second hand tube mills, sizes either 5½'x22' or 6'x20'. They prefer the latter size and are in the market now.

Texas Stone Products Co., 901 Insurance Bldg., Dallas, Texas, advise us: "We will need in the next 60 days a locomotive of about 30 to 40 tons capacity, standard gauge, also a 61 Marion Steam Shovel. Will purchase used machinery if guaranteed in good condition."

J. B. McCalley, De Queen, Ark., asks: "Where can I buy three or four 2-yd. side dump cars (two-way dump) 30" gauge new or second hand?"

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Situations Wanted

SITUATION WANTED

Experienced salesman, with proven ability in selling heavy machinery, including mining equipment, pneumatic tools, heavy duty engines and lighting equipment, both on the road and as inside man. 28 years old. Available for immediate connection.

Box 1497 **Care of Rock Products**

Plants for Sale

Help Wanted

WANTED

A competent superintendent taking charge of plaster board plant. Must have experience and satisfactory references. Address

Box 1496 **Care of Rock Products**

Plants for Sale

Help Wanted

WANTED

Quarry Foreman, one who understands quarrying, blasting and plant operation. State experience, salary wanted and give references. Plant close to Chicago. Address,

Box 1495 **Care of Rock Products**

Plants for Sale

AUCTION SALE

to close the Estate of Lowell M. Palmer, Dec'd

The Lime Quarry and Plant and Chalk Manufacturing Plant at York, Pa.

belonging to said Estate, will be sold by Public Auction in one parcel to the highest bidder complying with the terms of sale, without reserve, on

Friday, the 5th Day of August, 1921, at 12 M.

On the premises
BY ORDER OF

THE EQUITABLE TRUST COMPANY OF NEW YORK
CARLETON H. PALMER and A. WARD BRIGHAM, Executors and Trustees

The Lime Quarry and Plant consists of about 80 acres of land, with quarry now being operated, of high calcite and magnesia stone—10 Keystone Kilns and 2 large kilns equipped with gas producers, capacity about 250 tons of lime per day. Stone crusher, pulverizer and hydrators—large storage capacity. Plant fully equipped and in first class condition. The Chalk Plant consists of about 1 acre of land with mills and packing machinery and all necessary plant and equipment for the manufacture of fine chalk. Capacity about 55 barrels per day.

All bidders will be required to deposit with the auctioneer before the sale a certified check to the order of The Equitable Trust Company of New York for $10,000, which will be immediately returned after the sale in the case of unsuccessful bidders, and will be applied on account of the first payment required by the terms of sale in the case of the successful bidder.

For full particulars and terms of sale apply to

THE EQUITABLE TRUST COMPANY OF NEW YORK, Trustee
37 Wall Street, New York City

CARLETON H. PALMER, Trustee, 80 Beekman Street, New York City.

VAN VORST, MARSHALL & SMITH, Counsel, 25 Broad Street, New York City.

H. L. STRAYER, Auctioneer, York, Pennsylvania.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½x25′, 4x30′, 5½x50′ 6x50′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 3½x25′, 5x60′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 2½x3″ 3x3½′ pebble and ball mills; 8x4′, 6x4′ and 4x4′ continuous ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 30x60″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 36″ and 40″ cage mills; 3′ and 4½′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and No. 000, No. 00 and No. 0 Raymond mills; one No. 5 Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; one keystone excavator; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens, Richardson automatic scales.

Air compressors and tanks.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

"Everything for the Quarry"

3-ton Plymouth 4′x8½″ gauge Gasoline Locomotive.
10x16 cyl. 36-in. gauge Porter Saddle Tank.
9x14 cyl. 36-in. gauge Vulcan Saddle Tank.
7x12 cyl. 36-in. gauge Davenport Saddle Tank.
⅝-yd. Thew "O" Traction Shovel.
10—24-in. gauge 1½-yd. Western Dump Cars.
6—3-yd. Koppel 36-in. gauge Dump Cars.
15—36-in. gauge 4-yd. Western Dump Cars.
3—16-yd Western Air Dump Cars.
33-in. R. H. Lehigh Fuller Mills.
7x10 and 8x10 D.C. D.D. Hoisting Engines.
Rails, Track Material, Steam Shovels, Tanks

ZELNICKER IN ST. LOUIS
Send for bargain list—Bulletin 290

Derricks—Hoisting Engines

For derricks, hoisting engines and material handling equipment, write us and save money. We have in stock derricks 8″x8″ three tons to 20″x20″ thirty tons capacity. Also 70 hoisting engines and car pullers, one, two and three drums, friction drums, reversible, handle 5000 pounds on single line. Pumps, rock drills, crushers, cars, cable, rope, blocks, etc. $500,000 stock.

Wilson Machinery Company
331 West 35th St., Chicago

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

One 50-ton, standard gauge Baldwin Mogul; 170 lbs. pressure.
One 56-ton, standard gauge American 10-wheeler; 175 lbs. pressure.
Two 50-ton, standard gauge Brooks 6-wheel switchers; 160 lbs. pressure.
One 42-ton, standard gauge Shay geared locomotive.
One 24-ton, standard gauge Shay geared locomotive.
One 14-ton, 36″ gauge American Saddle Tank.
Two 23-ton, brand new 36″ gauge Porter 6-wheel switchers; separate tenders.
One Model 14-B Bucyrus Shovel.

The above are only a few items of our stock. Will gladly send you our complete stock lists.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR SALE

1—Ingersoll-Rand Type 10 belt driven air compressor complete with receiver and force feed lubricating system, A-1 condition. $1500.00 F. O. B. Plant.

1—2 drum steam hoist, 8x12 cylinders, 22 H. P. boiler. Also steam pumps and air drills.

American Gypsum Company
Akron, N. Y.

20—3-yard, side dump, 36″ gauge Oliver Tram cars.
14—1½-yard, side dump, 36″ gauge all steel tram cars.
12—1-yard, side dump, 36″ gauge all steel tram cars.
1—Sparta Number 30 oil or well drill rig complete.
2—48″ diam. by 24′ long American Process dryers.
Address

E. W. COOPER, ENGINEER
174 3rd Ave., No. Nashville, Tenn.

SEVERAL BELT BARGAINS

98 ft. 24″ 4-ply Rubber-Covered Conveyor Belting, slightly used.....$1.50 per foot
100 ft. 30″ 8-ply Canvas-Stitched Belting, slightly used.....$1.62 per foot

NATIONAL BELTING AND SALVAGE CO.
268 East Water St., Milwaukee, Wisconsin

CRUSHERS FOR SALE

2 Traylor Jaw—15″x24″ and 10″x16″.
2 Traylor Rolls—42″x14″ and 32″x10″.
1 50-ft. Bucket Elevator, 18″x10″ buckets.
2 18″ Belt Conveyors, about 75 ft.
Other grinding and drying machinery.
Send for List

HULBERT A. BOND
ROWAYTON CONNECTICUT

Bargains in Real Rebuilt Machinery

Air Compressors—Steam, size 150 to 3000 cu. ft. Belt driven, 147 to 1250 cu. ft. (2nd hand).
Air Receivers—36″ to 84″ diameter (new and used).
Boilers—8 H. P. to 500 H. P. (new and used).
Boiler Tubes—All sizes.
Engines—Steam, gas and oil, all sizes.
Electrical Equipment—Motors, generators, transformers. All motors are for 3 phase, 25 cycle, 220 or 2300 volt.
Gasoline Locomotives—All sizes.
Hoists—Single and double drums, steam and electric.
Pumps—Plunger, steam and electric.
Crushers, Rolls and Elevator Equipment for rock crushing plants.
Full Line of Mine and Mill Supplies.
Large Stock of New Solid Octagon, Red Star Drill Steel at 25 per cent less than present mill price.

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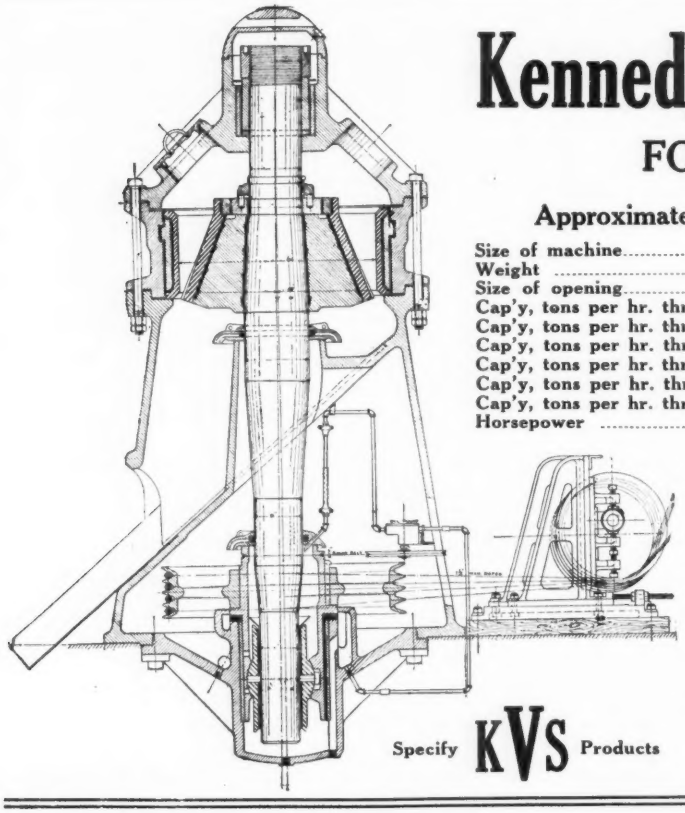

Kennedy Gearless Crusher

FOR FINE GRINDING

Approximate Dimensions, Capacity and Horsepower

Size of machine	No. 25	No. 37	No. 49
Weight	15000 lbs.	30000 lbs.	70000 lbs.
Size of opening	5½"	7"	12½"
Cap'y, tons per hr. thru ½" ring	12 to 20	.....	.....
Cap'y, tons per hr. thru ¾" ring	18 to 25	25 to 40	.....
Cap'y, tons per hr. thru 1 " ring	20 to 30	30 to 45	50 to 70
Cap'y, tons per hr. thru 1½" ring	25 to 35	45 to 70	65 to 100
Cap'y, tons per hr. thru 2 " ring	.....	50 to 100	80 to 125
Cap'y, tons per hr. thru 2½" ring	.....	.....	100 to 150
Horsepower	15 to 20	20 to 30	40 to 60

We carry these machines in stock for prompt shipment and guarantee capacities.

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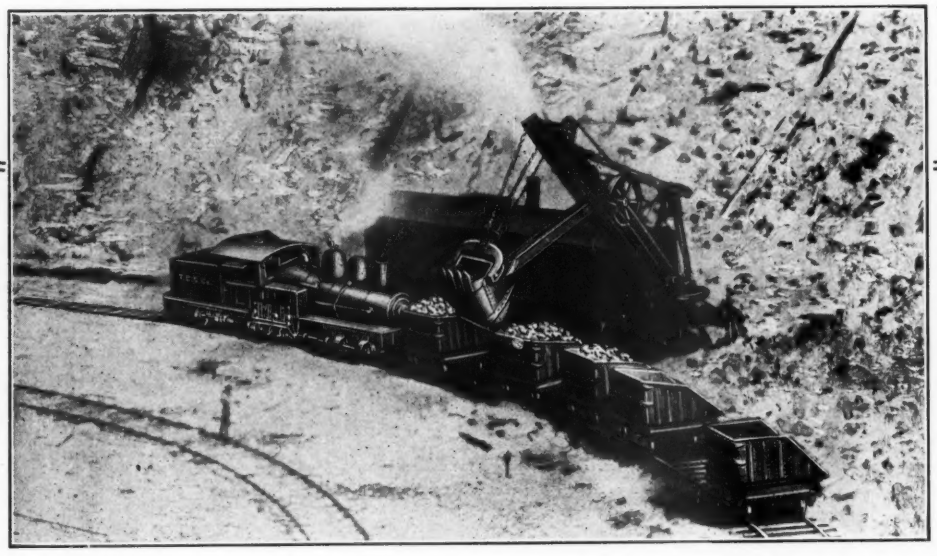

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